MINING CONGRESS JOURNAL

OFFICIAL

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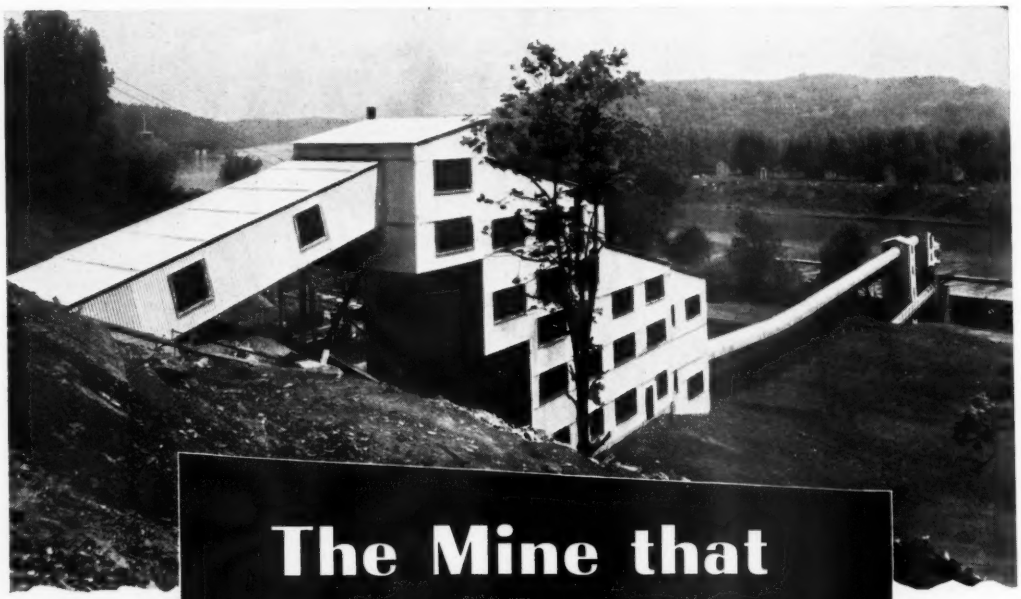

The Mine that Fits the Market

IT IS THE BUSINESS OF THE ROBERTS AND SCHAEFER ORGANIZATION to help the mine operator make his mine fit the market—today's market—which demands coal that is cleaned and prepared the modern way.

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MINING CONGRESS JOURNAL

Vol. 28 JUNE, 1942 No. 6

The 1942 Coal Mine Modernization Yearbook comes off the press July 15.

This "Coal-Convention-in-Print" brings you a complete account of the April 27-28 meeting of the Coal Industry at Cincinnati—An up-to-the minute review of all the important problems of wartime coal mining.

This volume is for busy coal executives, engineers and key operating officials—furnishing facts and information that will help solve production problems.

Order your copy today.

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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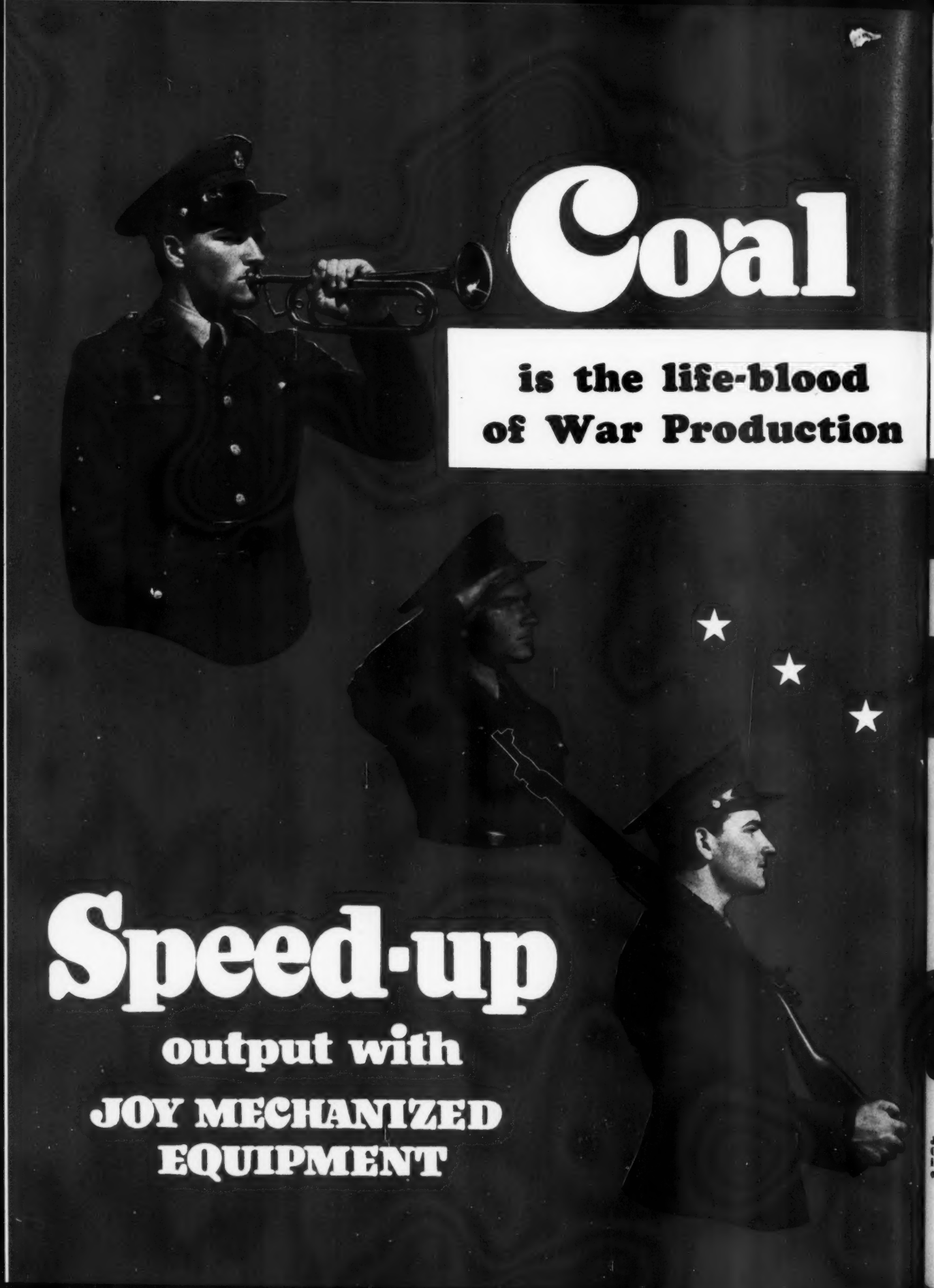
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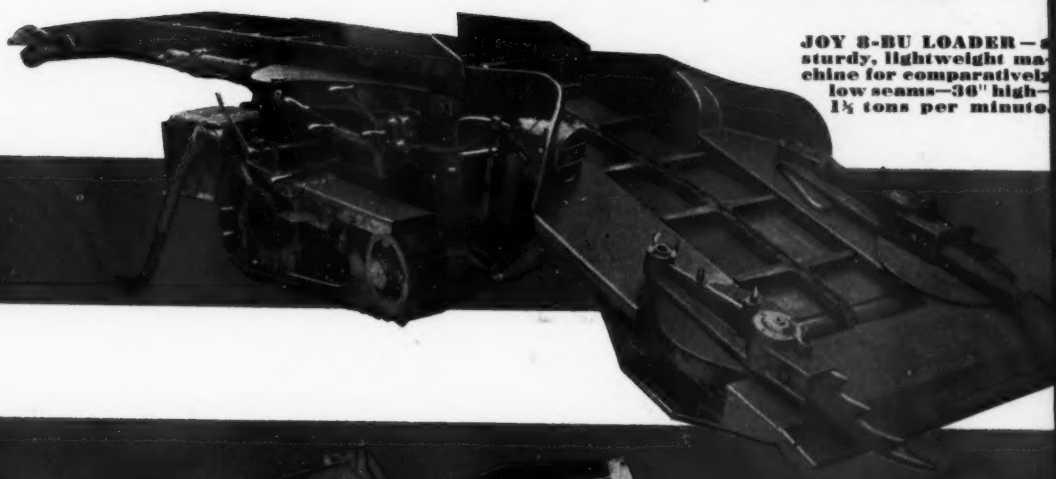

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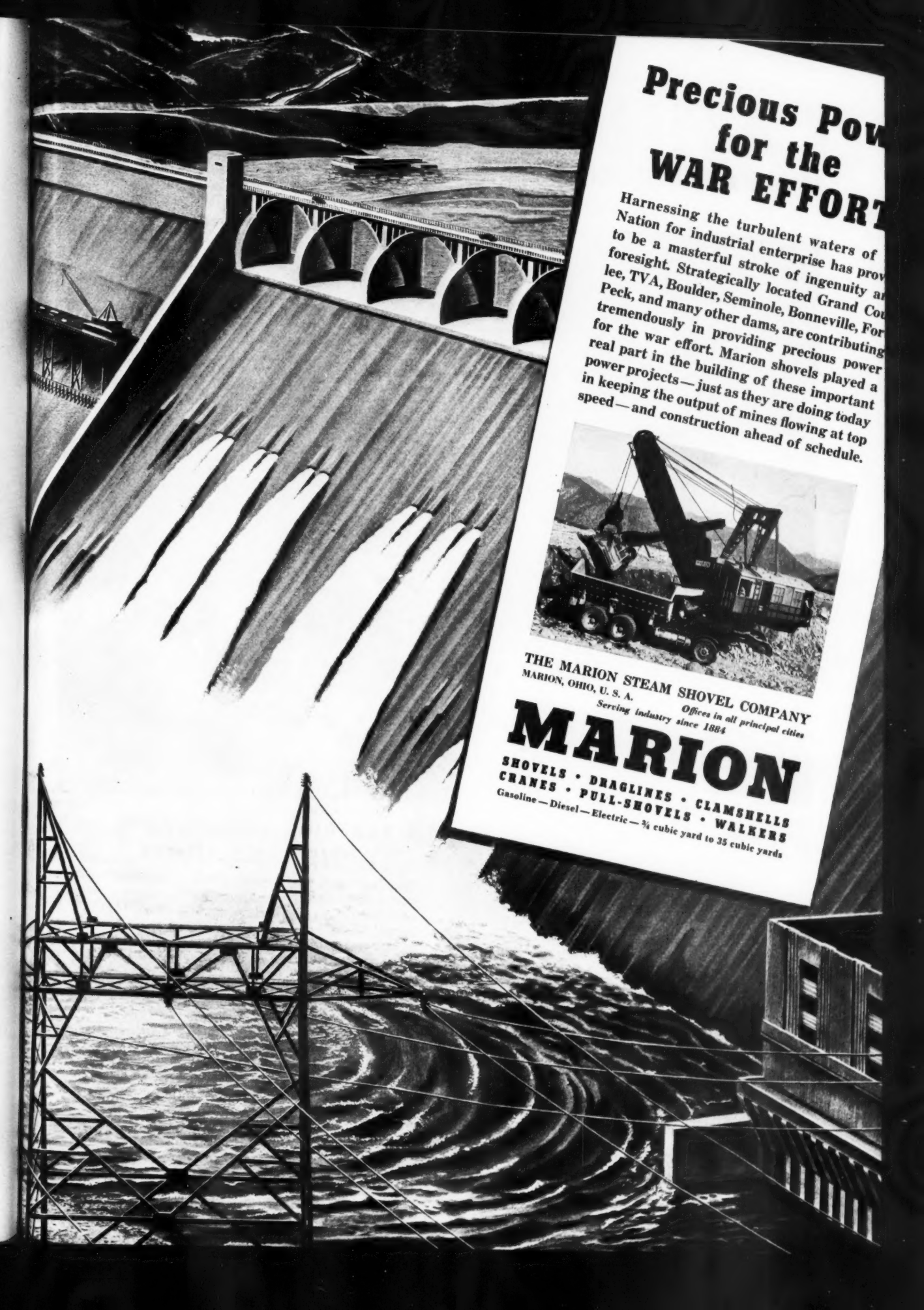

Precious Pow for the WAR EFFORT

Harnessing the turbulent waters of Nation for industrial enterprise has prov to be a masterful stroke of ingenuity a foresight. Strategically located Grand Cou lee, TVA, Boulder, Seminole, Bonneville, For Peck, and many other dams, are contributing tremendously in providing precious power for the war effort. Marion shovels played a real part in the building of these important power projects—just as they are doing today in keeping the output of mines flowing at top speed—and construction ahead of schedule.

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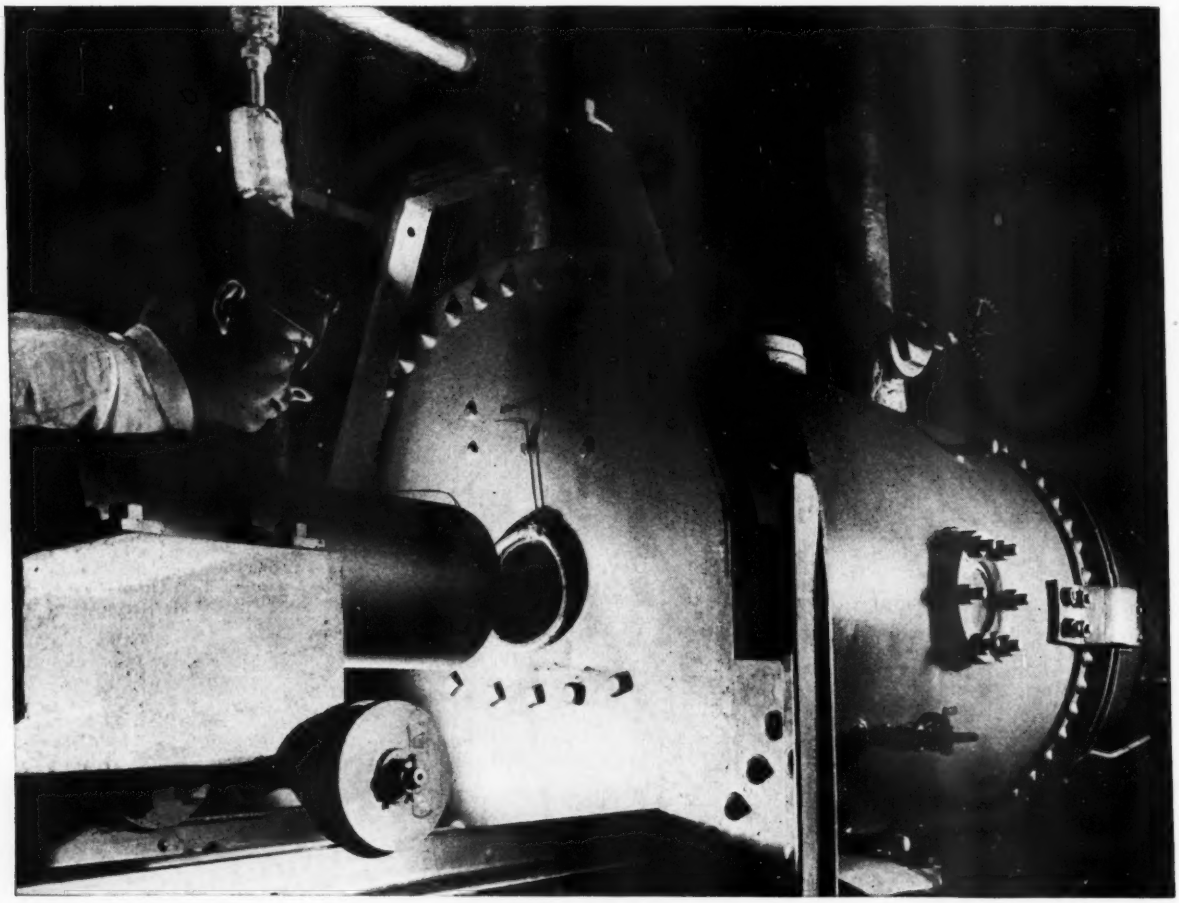

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THAT SAVES LIVES!

Stories of 3 Du Pont Products That Increase Safety and Reduce Costs In Coal Mining Operations

1 PERMISSIBLE EXPLOSIVES

You might mistake this testing gallery at the Du Pont Explosives Research Laboratory for some strange new field piece—for it goes off with the roar of a cannon. Actually, it's a device for evaluating the safety of coal mine explosives.

Real progress in the development of explosives safe for use in gaseous and dusty coal mines began with the development of testing galleries—of which du Pont had the first to be established by an explosives manufacturer. Today, thanks to research carried on with equipment such as this, the safety of permissible explosives is unquestioned, when used in a permissible way.

Du Pont research has given permissible explosives many other advantages in addition to safety. For example, early permissibles were too fast—they shattered the coal—until du Pont chemists showed the way to the first slow, non-shattering permissibles with excellent spreading and heaving action. The result was an advance of tremendous economic importance to every operator.

Du Pont has pioneered many such improvements. The first low velocity, high count permissible—the kind that makes possible better distribution of the charge and reduces overloading—was introduced by du Pont, as was the first American gelatinous permissible for wet work and rock shooting. So too, the first semi-gelatinous permissibles that now do the work of gelatins, at a cost saving, were originated in the du Pont laboratories.

Today, du Pont research carries on—in the world's largest and best-equipped laboratory devoted to the development of industrial explosives. That laboratory—its trained staff—its backlog of experience—and its record of accomplishment—are a guarantee that you'll get the best in permissibles *first* by calling on du Pont.

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The safest place in a mine is one that is free of poor air. These conditions are possible at the face only when adequate ventilation is maintained. This can be achieved by properly installed and operated auxiliary ventilation. Past experience has proved that the use of "Ventube"* as approved by various State Departments of Mines is an economical and efficient method of obtaining adequate ventilation for gangways and chutes, for chambers and rooms, when driving entries through faults, in driving through old workings, in reopening old mines and in advanced development. For complete details send for your copy of the new "Ventube" handbook. Write E. I. du Pont de Nemours & Co. (Inc.), "Fabrikoid" Div., Empire State Bldg., New York City.

*"Ventube" is du Pont's registered trade mark for its rubber impregnated flexible ventilating duct.

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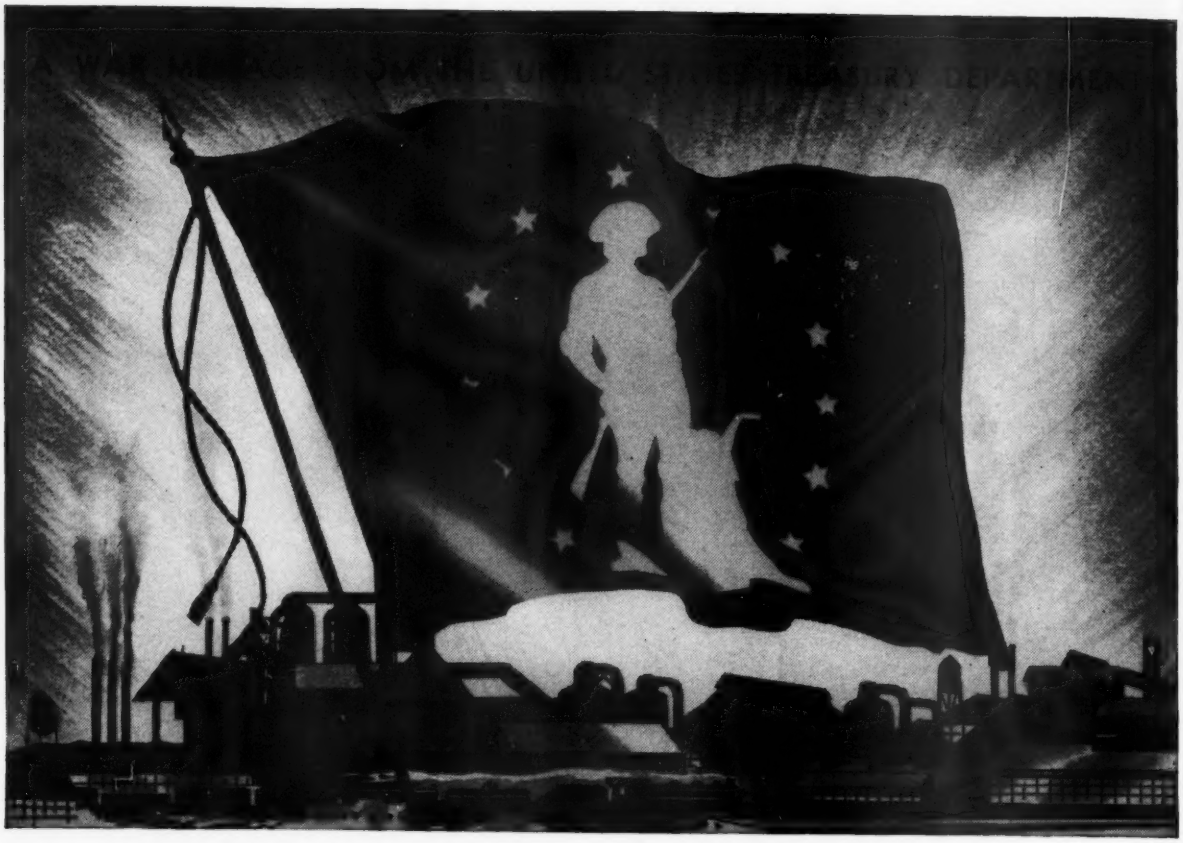

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Signifying 90 Percent or More Employee Participation in the Pay-Roll Savings Plan

IT doesn't go into the smoke of battle, but wherever you see this flag you know that it spells Victory for our boys on the fighting fronts. To everyone, it means that the firm which flies it has attained 90 percent or more employee participation in the Pay-Roll Savings Plan . . . that their employees are turning a part of their earnings into tanks and planes and guns *regularly,* every pay day, through the systematic purchase of U. S. War Bonds.

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If your firm has already installed the Pay-Roll Savings Plan, now is the time to increase your efforts: (1) To secure wider participation and reach the 90-percent goal; (2) to encourage employees to increase their allotments until 10 percent or more of your gross pay roll is subscribed for Bonds. "Token" allotments will not win this war any more than "token" resistance will keep our enemies from our shores, our homes. If your firm has yet to install the Plan, remember, TIME IS SHORT.

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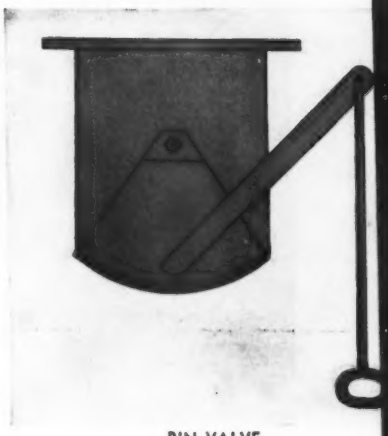

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UNDER CUT GATE—ROCK OR LUMP COAL

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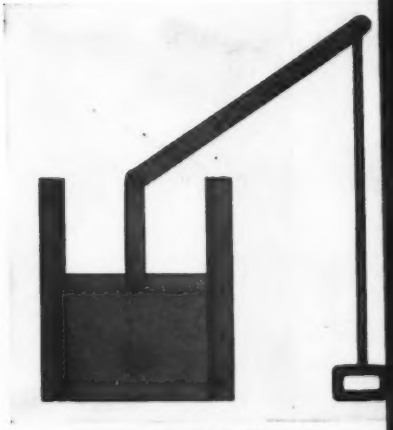

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BINS - GATES - LOWERING SPIRALS - DUST-O-LATORS - SHAKING GATES

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Because accidents interrupt output—

Greater Safety *means* Increased Production

Imperative Today!

Every accident brings not only a measurable loss in man-power and man-hours—but often an equally serious loss in equipment-hours as well. And anything that reduces the effectiveness of America's production machinery is a vital concern today.

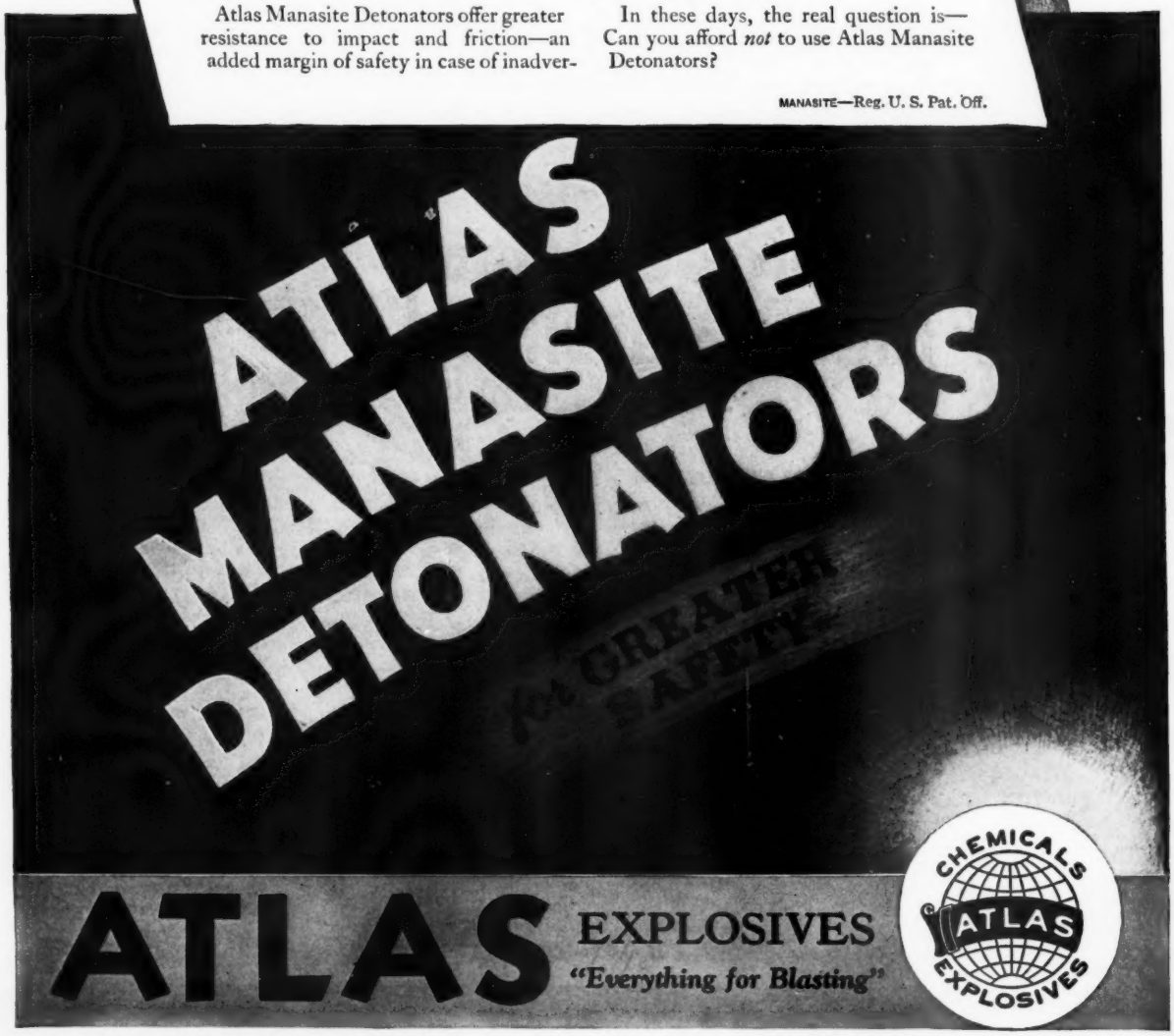
For this reason, the greater safety of Atlas Manasite Detonators becomes more important, more desirable than ever.

Atlas Manasite Detonators offer greater resistance to impact and friction—an added margin of safety in case of inadvertent mishandling. While no blasting cap can be called "safe," Atlas Manasite Detonators make safety precautions not less important—but more effective.

Furthermore, the adoption of Atlas Manasite Detonators requires no time-consuming changes in operating technique. And since they cost no more, you get more for your money.

In these days, the real question is—Can you afford *not* to use Atlas Manasite Detonators?

MANASITE—Reg. U. S. Pat. Off.



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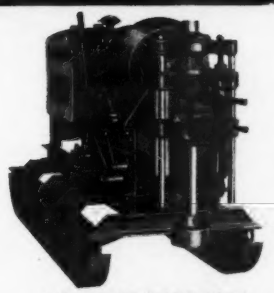
The war-time demand for ores, coal and strategic minerals ha put the mining industry on an all-out production schedule in an effo to meet this demand.

Sullivan Core Drills are playing an important role in speeding th location of new ore bodies and new coal seams to augment this effor

Typical of such operations is this picture of a Sullivan No. I Core Drill prospecting for tungsten minerals.

The Sullivan No. 12 is a modern, high-speed core drill inco porating such features as direct drive; gasoline, air or electric powe screw feed or hydraulic feed swivelheads; anti-friction bearings throug out; alloy steel gears and shafting; planetary hoist, 3-speed transmissio and knock-down skid mounting. The No. 12 core drill has a capacity o 750 ft. for surface drilling and 500 ft. for underground drilling.

Sullivan manufactures a complete line of Core Drills with ca pacities from 250 to 12,000 feet and, in addition, maintain equipment and skilled crews for core drilling on a contract basi



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A MEMORANDUM TO COAL MINE OPERATORS

IN THE INTEREST OF WAR PRODUCTION

For over 33 years we have built Mechanical Loading Machines exclusively. To meet the present emergency demands, we have increased production to build as many Whaley "Automats" as the supply of the needed materials will permit.

No doubt you know that materials are made available only as the need for them arises, and that orders for such materials must be anticipated by manufacturers well in advance of the time required for deliveries.

Therefore, it will help all of us if you will give immediate thought to the suggestions of the War Production Board, namely: that you analyze your production facilities and anticipate your requirements for "Automat" loaders for 1942 and 1943. Then let us help you determine how the Whaley "Automat" can be applied in your mine to meet your requirements for essential increased production and conservation of manpower.

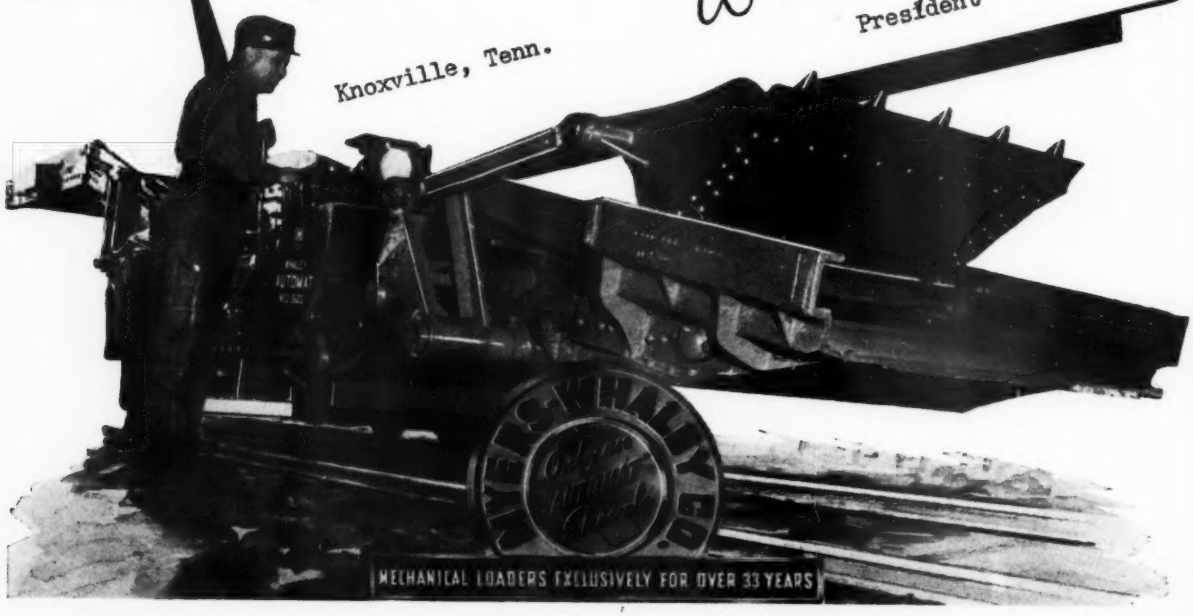
Your cooperation will be greatly appreciated at this time, and you may be assured that we shall be happy to work with you. Please do not hesitate to call on our engineers for information.

Myers-Whaley Company

Wm. Whaley

President

Knoxville, Tenn.



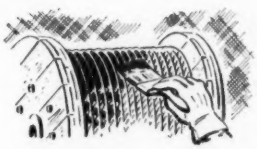
"We build the stamina in... proper lubrication will keep it there!"

"Yes sir, Roebling 'Blue Center' Steel Wire Rope leaves our shops ready to give you the longest, lowest-cost rope service you can buy at any price. But, neglect it in service—give it the absent treatment as far as lubrication is concerned—and you are literally throwing good rope steel and a portion of your rope service out the window.

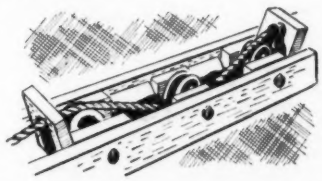
Pound for pound, wire rope probably has more bearing surface (inside the rope) than any other piece of machinery. Think of wire rope as a precision machine and you'll give it the same care as any fine equipment. All right, you say, what's the best type of lubricant to use—what's the best way to apply it?

As a starter, the best lubricant is one made specially for lubricating wire rope (never discarded crankcase oil!)... free from acids and corrosive elements . . . generally heavy-bodied, straight mineral lubricants of good penetrating and adhesive qualities. In addition, make sure it does not cake, gum or ball-up if contaminated with an excess of dust, dirt or metallic particles. And it must *not* thin down under high temperatures. If you're in doubt about what you're using, Roebling Engineers will give you recommendations as to the proper type.

Now, there have been lots of arguments about the best way to lubricate . . . principally because wire rope operates under such widely varying conditions. But here are some basic facts.



Some prefer to apply it with a brush. It's the simplest way—not always adequate but certainly better than none at all. If you brush, do it slowly, carefully, frequently . . . for it's the most difficult method to get complete coverage and penetration.



A better way is this simple three-sheave trough. It should be firmly fixed near the reel or drum, the lubricant applied hot and the rope run through not faster than 30 feet a minute. And, there are as many other good lubricating devices as human ingenuity can devise—to meet specific operating conditions.

One more pointer . . . be sure that your wire ropes are well lubricated when not in service—for when ropes are idle is when they are most susceptible to rust destruction. And, finally, set up a periodic lubrication and inspection schedule . . . so that you get maximum useful rope life . . . so that you get the extra service that has been built into every inch of wire rope that bears the Roebling Trademark . . ."

JR ROEBLING

Extra rope service from Roebling Research and Engineering, from the knowledge of men in the Roebling mills, of Roebling men in the field . . . they all add up to "Blue Center"—the Roebling wire rope that offers you lowest average operating cost per ton of material handled.

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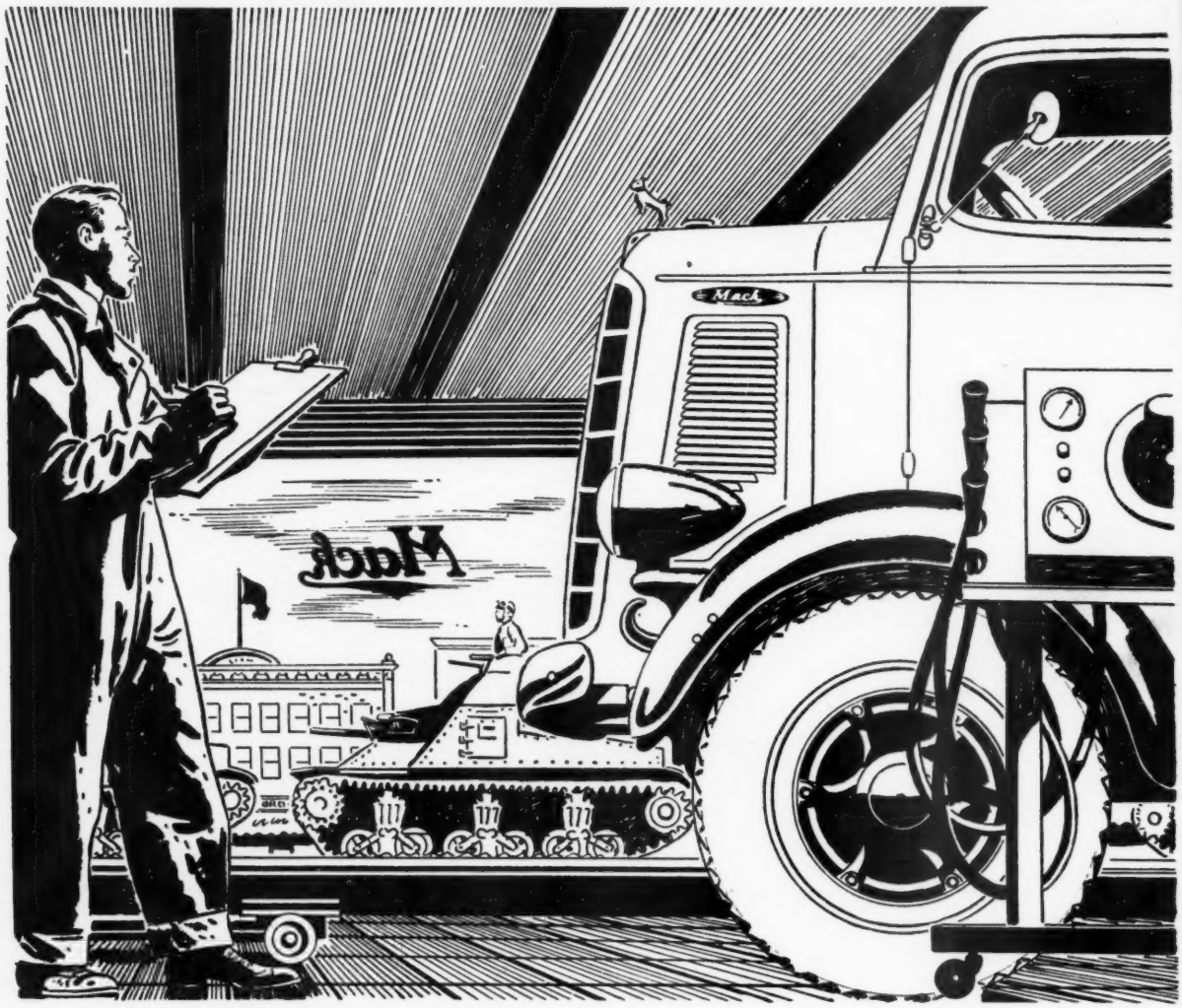
Every hour of lay-up time saved brings Victory a little closer . . .



A Message to Mack Owners on Truck Maintenance

It's going to be increasingly difficult to replace trucks during the critical days that lie ahead.

You who own Mack trucks have the advantage of the extra durability that's built into them. (That Macks *do* last longer is proved by figures which show that 7 out of every 10 Macks bought ten years ago are still in profitable use. *R. L. Polk survey, as published in Automotive News.*) But you can't hope to get the most out of your Macks unless you have them serviced promptly—regularly—at the nearest Mack factory branch or Mack dealer.

Consult your local Mack service manager for helpful, constructive advice on how best to conserve your truck equipment. Ask him about the Mack "Preventive Maintenance Plan," a practical system of periodic inspection and adjustment, which will save you money on repair bills—keep your trucks on the road for extra thousands of miles.

Remember, a truck is something more than a private investment in time of war. As a part of our vital transportation system, it is a public responsibility. Let us help you "keep 'em rolling."

MACK TRUCKS, INC., LONG ISLAND CITY, N. Y.

THE MOST COMPLETE LINE OF TRUCKS IN THE WORLD—
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You can assure a continuous supply of dustless treated coal by specifying

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aladd is applied at the mine by standard ng equipment and, due to its composition, omized liquid spreads rapidly upon con- lo heat is required at any time.

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aladd" treated coal is coated with a rent protective film. This retards degra- due to oxidation. ***Coaladd*** treated coal e stored indefinitely without change of Since all the dust is tied down and the copic film is constantly renewing its mois- ne danger of spontaneous combustion in is minimized.

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aladd is the only material that all the requirements of the pro- dealer and ultimate consumer.

Ask for complete details

Loading Untreated Coal — unretouched photograph

The same coal treated — unretouched photograph

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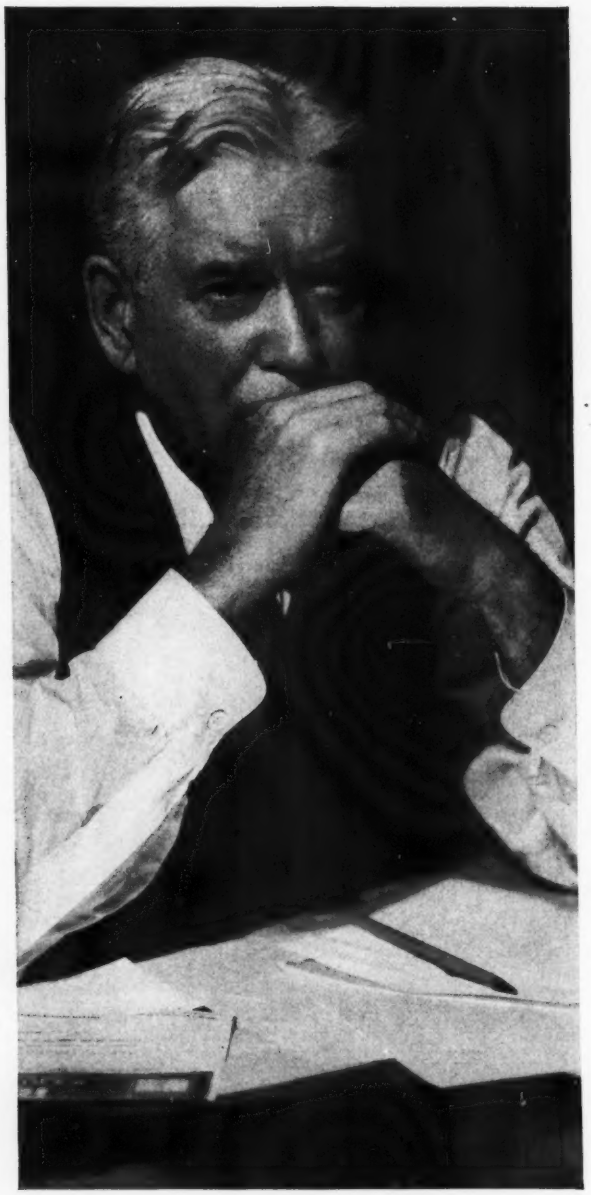

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A JOURNAL FOR THE ENTIRE MINING INDUSTRY—PUBLISHED BY THE AMERICAN MINING CONGRESS

MINING CONGRESS JOURNAL

HARRY C. CHELLSON
Editor

Vol. 28 JUNE, 1942 No. 6

LABOR PEACE—A PRELUDE TO WORLD PEACE

PUBLIC opinion has crystallized unity among 130,000,000 Americans to win this war in the shortest time possible. This objective, therefore, should leave no need for strikes or labor unrest. The rank and file of American labor and industry everywhere are working and sweating shoulder to shoulder, producing a war machine the like of which the world has never seen, so as to assure our Nation, and liberty-loving people everywhere, victory and a just and understanding peace.

In wartime, obviously there are reasons why there is so-called peace between labor and industry. But what about the time when peace comes after this war? There is much talk about our post-war planning—how the industrial machine can keep producing, keeping millions employed—how the returning soldiers will be given employment in private industry and government projects—how there will be no boom or depression, but a planned economy collectively maintained and supported by government, labor and private industry that will provide security for all. To assure this Utopia after this cataclysmic war, will our government have to take over union labor and private industry, or what remains of it? We hope not.

The rank and file of labor fully realizes its welfare and existence in our American form of life, for which we are all fighting, depends upon the economic fertility of private enterprise. Private initiative will continue to be the only spring of greater creative wealth for this nation as long as it is encouraged to survive. But, untried theoretical regulations promoted by selfish racketeering labor leaders and supported by ambitious politicians and advisors are rapidly strangling private enterprise and corrupting a free American labor movement, under the cloak of the war emergency.

One day at the world peace table, we will want to be looked up to as the leader of nations comprising a happy people living in a true democracy. Among the many features of our life we will have to boast about must be our model of labor-industry relations for other nations to inspect and perhaps adopt as a pattern. We must prepare now to get our house in order for that time, and remove factional labor strife and fabricated misunderstandings between labor and industry by legislative means. This method is apparently the only realistic one which the people of the country can insist their representatives resort to, as labor leaders have not yet demonstrated their capacity to produce labor peace. The rank and file of American labor wants to maintain confidence, collective bargaining, fair dealing and mutual trust with industry; public opinion demands it, and many leaders of industry have been fighting a long, lop-sided, misunderstood battle to create it. To achieve and maintain these worthy objectives now, before peace comes, labor organizations must assume the same responsibilities in a democracy as a private enterprise. Unions should become incorporated by law, they should have their books examined and certified accounts made and reported to their members at least annually, and among other stipulations, officers and union leaders should be American citizens and be thoroughly experienced in the trade, industry or profession they represent. American labor can purge itself of its undesirable elements only by realistically subscribing to and supporting a fair labor regulation bill, thereby helping to get our house in order before we sit around any peace table, and perhaps offer suggestions to starving, revolutionary minded peoples in devastated countries how they shall plan their economic future.

DECISION PENDING ON METAL CONVENTION

AS we go to press leaders of the metal mining industry, the Board of Governors of the Western Division and the National Board of Directors of the American Mining Congress are being canvassed for their views whether the regular fall meeting of western mining men, minus the usual exhibits of mining equipment, should be held; and if so, where and when. It is recognized that transportation facilities are being allocated more and more for our war offensive, and that mining men everywhere are fully occupied boosting metal output to new highs, yet an industry-wide conference for the purpose of exchanging views and discussing problems with representatives of the government and war agencies might well be a worth-while contribution to the war program.

Final decision, however, will probably be deferred until somewhat later in the summer, at which time a clearer view of the whole situation can be had.

MORE MINE SAFETY EFFORT

THE Coal Division of the American Mining Congress has recently organized a Safety Committee whose personnel will include coal operators, members of the U. S. Bureau of Mines, and State Mining Departments. Its purpose will be to promote safety in the coal industry. Recognizing its greatest difficulty to be a maintenance of balance between safety and practicability, the committee will approach this problem with an unbiased mind. It urges that all concerned in the work do likewise, as the objective is to keep the mines at maximum operation for the war effort and also keep men from being injured.

Mine safety is considerably more of a problem in wartime. Therefore, all effort to enlighten the operator as well as educating the foremen and miners about the many advances and new features of safety equipment, such as electrical transmission systems having complete safety devices for coal mines, will be a valuable contribution toward reducing the accident rate in the industry.

MINERAL MATTER IN COAL[1]

● ***An investigation was carried out by means of the petrographic microscope covering more than 3,000 thin sections representing about 100 coal beds. The most common minerals observed were kaolinite, pyrites, calcite, quartz and siderite.***

By

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IT IS believed that the petrographic study of mineral matter in coal will have considerable practical value in planning an intelligent program of improving fuels by selective mining or coal cleaning, for the petrographic microscope not only reveals the kind of minerals but it also shows the approximate proportion of minerals, the grain size of the minerals, and the exact manner in which the minerals are associated with the coal constituents.

FUEL technologists have been always interested in research on the mineral matter in coal, for they have long realized that the mineral constituents are of great importance in its mining and preparation for the market and that these constituents affect its carbonization and combustion characteristics.

Larger impurities in coal, such as the shale bands, pyritic impurities, ankerites, and materials of similar nature have been correctly identified and described in several recent publications on coal.[2, 3, 4]

Microscopic forms of mineral constituents in coal are more difficult to identify, and consequently the reader will find a surprisingly small amount of information in the literature on this type of impurity even though its importance is always recognized.

Petrographic investigations of coal by the Bureau of Mines have made available a vast amount of material for the study of mineral matter in coal. More than 3,000 thin sections, representing about 100 coal beds, have been examined for mineral constituents. The numerous interesting photomicrographs in the complete report on this work clearly reveal the manner in which such minerals as kaolinite, calcite, siderite, quartz, and pyrite are associated with the coal constituents. The report will be published as Bureau of Mines Technical Paper 648.

It is believed that the results of the petrographic examination of mineral matter in thin sections may have practical application in problems relating to the mining, preparation, and utilization of coal. The thin sections reveal not only the kind of mineral, but also the approximate amount and distribution of the mineral constituent.

Although the exact meaning of the term "inherent mineral matter" is somewhat confusing, it is usually defined as that portion of the mineral matter organically combined with the coal. Little is known about inherent mineral matter because it cannot be detected by the petrographic microscope. It contains elements that have been assimilated by the living plant, such as iron, phosphorus, sulphur, calcium, potassium, and magnesium. These elements, which are essential to the proper growth of plants, are absorbed through the root system and combine organically with the plant tissues. Other elements, such as silicon, sodium, manganese, and aluminum, are found in many plants, but these are not considered essential to normal plant growth.

The loss in inherent mineral matter usually is explained by leaching. Swamp waters percolating through the peat mass removed soluble portions of the inherent mineral matter. Some of the inherent mineral matter may have been removed by subsequent generations of plants. The roots of many of the swamp plants did not extend to the soil of the swamp floor, but they penetrated through the old, partly decomposed, plant material, where they obtained sufficient mineral constituents for their own use.

The extraneous mineral matter in coal is that part foreign to the plant material contributing to the formation of the coal. It may represent minerals deposited contemporaneously with the peat, or minerals deposited in the cleavage and fracture cracks after the peat has been consolidated.

All of the common minerals in coal that are classed as extraneous mineral matter may be observed in thin sections of coal, and the thin sections show the manner in which

[1] Published by permission of the Director, Bureau of Mines, United States Department of the Interior.

[2] Moore, E. S., Coal: John Wiley & Sons, Inc., 1940, 473 pp.

[3] Raistrick, A., and Marshall, C. E., The Nature and Origin of Coal and Coal Seams: The English Universities Press, Ltd., London, 1939, 282 pp.

[4] Stutzer, O., and Noe, A. C., Geology of Coal: The University of Chicago Press, Chicago, 1940, 461 pp.

the mineral matter is associated with the coal constituents.

The order in which the minerals are considered in this report is the approximate order of their abundance in coals that were examined. However, it should be stressed that this does not represent the order of abundance in every coal, for many coals are characterized by a particular mineral or a group of two or more minerals.

Clay is the most common impurity in coal and clays are usually a mixture of several minerals—among which the kaolin minerals, quartz, a sericite-like mineral, and pyrite are common.

Kaolinite—Largely Deposited During Peat Stage of Coal Formation

The mineral kaolinite ($H_4Al_2Si_2O_9$) should not be confused with the rock kaolin. Kaolin is the rock mass composed largely of the clay minerals, which are hydrous aluminum silicates. A large part of the kaolinite in coal was deposited during the peat stage of coal formation. Kaolinite was carried into the peat bog by streams draining into the swamp, and the evidence leads to the conclusion that most of it was deposited from solution. A secondary type of kaolinite occurring in the cleats or joints was evidently carried in solution by percolating water and deposited after the peat stage of coal formation.

"Eye-coal" receives its name from the numerous circular discs or "eyes" that lie in parallel planes. These "eyes" were very numerous in a sample of brittle anthraxylon received from British Columbia. Each "eye" (see Fig. 1) was covered with a thin film of kaolinite, and in many instances the kaolinite contained a nucleus of iron-magnesium carbonate. Other investigators have found calcite and pyrite within the "eye" structures.

The formation of the "eye structure" has been explained in two ways. (1) It developed through shrinking or drying-up of the coal mass, particularly the woody bands thereof, and the mineral matter was deposited within the small desiccation cracks in the early stage of coal formation. (2) Stutzer[5] believes that "eyes" originate as a result of pressure.

Examples of tissues impregnated or replaced by kaolinite have been observed in coal although such occurrences are uncommon. Usually the petrifactions are not as perfect as those observed in coal balls. Kaolinite is a common mineral in high-ash coals, bony coals, and a few bituminous shales. These impurities are fully discussed in the report.

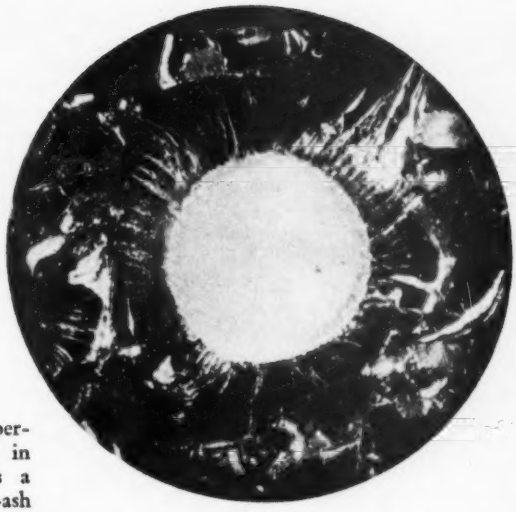


Fig. 1. Small facets or "eyes" observed on a sample of British Columbia coal. Each "eye" enclosed a thin film of kaolinite, some having a nucleus of iron-magnesium carbonate as shown in the illustration. When viewed on the edges, the "eyes" are seen as small vertical cracks filled with mineral matter. X10

Iron Pyrites—Positive Identification Is Somewhat Difficult

Pyrite and marcasite are forms of iron disulfide—pyrite is the cubic form and marcasite is the orthorhombic. Generally, pyrite is brass yellow, whereas marcasite is more gray. Marcasite is more susceptible to atmospheric weathering than pyrite. It is generally believed that both pyrite and marcasite are present in coal. However, positive identification of either mineral is somewhat difficult. Unless there is definite evidence that the mineral is marcasite or pyrite, it is more convenient to refer to it as "pyrites" or "iron pyrites" with the understanding that these names are used in a generalized sense to include both pyrite and marcasite.

The origin of iron pyrites in coal is problematic. Several interesting theories have been presented, but usually these are not supported by experimental data. It is generally agreed that the action of certain bacteria on the proteins of decaying organic matter will produce hydrogen sulphide, which in turn reacts with ferrous salts in solution to produce ferrous sulphide. The transition to iron disulphide has not been demonstrated experimentally, although a supposed intermediate product has been described. Reactions similar to these probably were responsible for most of the pyrites deposited during the peat stage of coal formation.

Iron pyrites may occur in the form of lenses (Fig. 2) and bands, balls or nodules, veins, pyritized fossils, and finely disseminated particles. The balls or nodules usually consist of mixtures of pyrites and any of the following

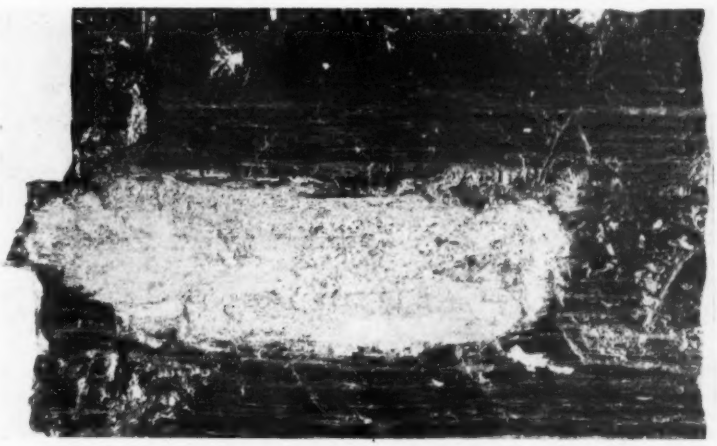


Fig. 2. Shows a typical lense of pyrites embedded in a lump of coal. Lenses of this sort often grade into bands which may be continuous over a large area

[5] See reference 4.

materials: Clay, siderite, calcite, and dolomite. They may occur irregularly throughout the coal or they may be concentrated in certain benches or bands of the bed. Thin veins of pyrites fill the joints or cleats of many coals. This form of pyrites is obviously of secondary nature and was deposited (sometimes with kaolinite or calcite) in the joints or cleats that developed after the coal was compacted. A large part of the total iron pyrites in coal occurs in the finely disseminated form as in Figure 3. This type of impurity is easily detected in thin sections under the microscope; the particles are black when viewed by transmitted light and have a silvery luster when reflected light is employed. Pyritized plant tissues, as in Figure 4, are common in the high-sulfur coals. As a rule, such tissues are difficult to section because pyrites is hard and brittle and breaks away from the softer coal substance.

Calcite—It Occurs as Veins in the Cleat and Fracture Joints

Calcite ($CaCO_3$) is an important mineral ingredient of many coals, and sometimes it occurs to such an extent that ultimate and proximate analyses are meaningless unless suitable corrections for CO_2 content are made. It is often contaminated with ferrous carbonate or may grade into ankerite, which is a mineral containing carbonates of calcium, magnesium, and iron, with a small percentage of manganese.

Although part of the calcite in coal was deposited during the peat stage of formation, it is believed that the larger portion was deposited in cleat and fracture joints after the coal was compacted. It occurs as veins in the cleat and fractures of coal much in the same manner as kaolinite. In fact, both calcite and kaolinite commonly occur in the same lump and even in the same vein.

Impregnation with calcite tends to make coal much harder and less friable. Calcite seals the cleats and fractures and unites the coal into a solid compact mass. Partings of bituminous shales in coal sometimes contain appreciable amounts of calcium carbonate. In such calcareous shales, the calcite acts as a cement, and it is not always easily detected by microscopic examination.

Quartz—Is Common in Certain High Ash Coals

Quartz (SiO_2) is entirely or almost entirely absent in many coals but is the predominant mineral constituent in a few beds. It is common, especially in certain high-ash coals and bony coals, and in coals with sandstone floors and sandstone partings. It occurs largely in attrital debris, along with such constituents as spores, resins, opaque constituents, woody fragments, and leafy tissues. Figure 5 shows a cannel coal with a high concentration of quartz. From an illustration of this sort it is not always possible to distinguish quartz grains from fragments of spores or even from holes left in the section where grains of minerals pulled out when the thin section was prepared. However, under the petrographic microscope, the true nature of the mineral constituents is observed readily. The quartz grains range from more or less round particles to highly angular particles, and from their size and shape it is impossible to determine

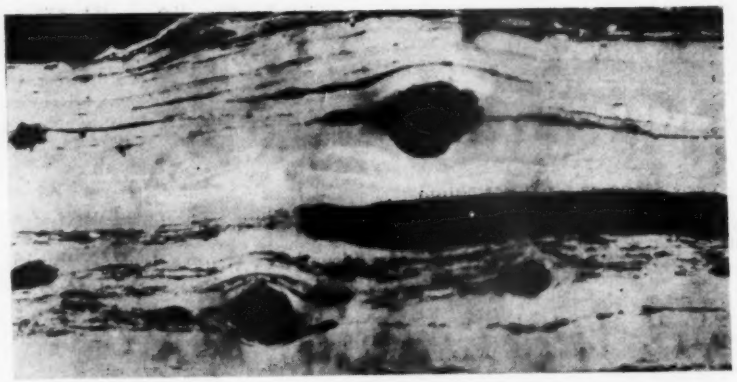


Fig. 3. Irregular to round black masses of finely disseminated pyrites embedded in an anthraxylous coal. X200

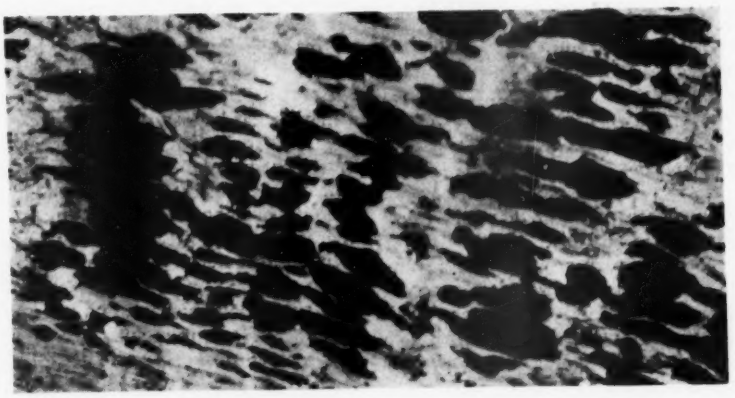


Fig. 4. Pyritized plant tissue in coal. X200

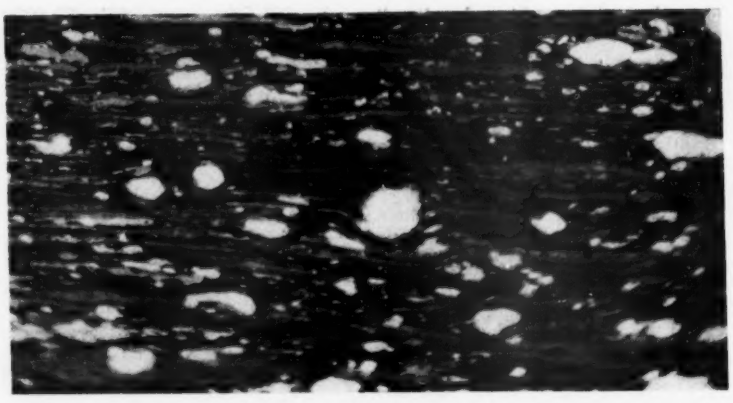


Fig. 5. Irregular to round white quartz particles occurring in a ground mass of dark gray fragments of woody material. X100

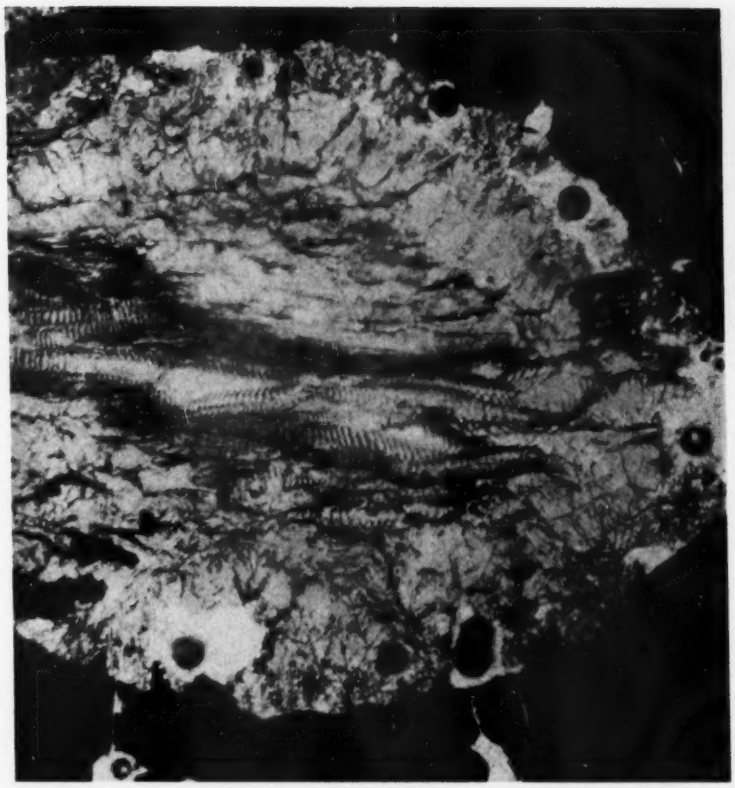


Fig. 6. Thin section of siderite nodule or miniature coal ball that contains remains of trachoids from one of the ancient carboniferous plants. X200

whether the quartz particles were deposited by wind or by water.

A good example of quartz formed from solution or colloidal suspension was observed in a thin parting in a Wyoming bituminous coal. Quartz veins were very rare in the coals examined for this report.

Siderite—It Occurs as Impure Nodules

Siderite ($FeCO_3$), a common mineral constituent of some coals, is easily distinguished by microtests. In coal it is nearly always characterized by a brown stain of limonite on the surface and between the boundaries of the crystals. Siderite changes to brown or brownish black limonite upon exposure and by further loss of water may change to hematite.

Siderite occurs as impure nodules in coal. Many of the nodules are miniature coal balls; that is, they contain petrified or carbonized plant material (see fig. 6.) The remains of plant material within the siderite nodules may consist of a variety of plant tissues, such as leaves, stems, cuticles, in fact, almost any of the plant material that contributed to the peat bog. Impure siderite or iron carbonate associated with organic matter, clay, pyrite, limonite, and quartz may occur at lenses or bands. The name "black band" has been applied to this type of impurity.

Miscellaneous Minerals Are Best Determined by Float-and-Sink Separations

The minerals that have been described constitute the bulk of the mineral matter in coal; other minerals occur but may be regarded as accessory and probably do not influence the properties of ash to any great extent. Sometimes these accessory minerals can be recognized in thin sections of coal, but usually the identification is more successful if the minerals are concentrated by float-and-sink separations.

In the investigation of the Illinois No. 6 bed coal, Ball[6] reported that he found feldspar, garnet, and hornblende fairly common. He stated further that "other minerals present in this group are apatite, muscovite, zircon, epidote, biotite, augite, kyanite, rutile, staurolite, topaz, tourmaline, and chloritic material. Zircon and apatite are more abundant than the others, although the total quantity of these minerals is very low." In addition to most of the above minerals, the authors observed considerable limonite, some sphalerite, and a micaceous mineral that has been called "sericitelike mineral." Sphalerite was observed in the form of an extremely thin film on kaolinite in cleats and small cracks.

[6] Ball, Clayton G., Contributions to the Study of Coal: Mineral Matter of No. 6 Bed Coal at West Frankfort, Franklin County, Illinois: Illinois State Geological Survey, Report of Investigations No. 33, 1935, 106 pp.

Distribution of Mineral Matter

Petrographic study of coal reveals not only the kind of minerals but also shows the approximate proportion and distribution of minerals in coal beds. In some coals the amount and distribution of mineral matter is uniform from top to bottom of the bed, and in such coals the total ash content may be small, medium, or large. Coals

(*Continued on page 72*)

Fig. 7. Photomicrograph of a layer of coal that contained only 1 percent ash. The white particles are spore material and not mineral matter. X200

Iron ore is moved from the bottom of the pit by this wide conveyor belt in the Lake Superior iron country

Belt Conveyors in Metal Mining

Since 1932 this method of handling ores has gradually improved, and now it has "earned its spurs" in the metal industry.

By W. E. PHILIPS
200 W. Pershing Drive,
Chicago, Ill.

TODAY, this dependable and economical method of transporting ores is reducing costs for progressive operators on the Mesabi Range where a fifth of the world's iron ore is produced. Conveyors are also speedily moving metal and non-metallic ores through concentrating plants that eventually reach industrial plants in metallic form for making ships, airplanes, tanks and guns.

Economy of operation is only one of the many advantages of belt conveyor transportation, and, because what has been done in Minnesota can be done just as successfully in other fields, this article will touch briefly upon a few of the benefits of this modern continuous handling method which lends itself equally well to practically any service requirements, anywhere.

It long has been an acknowledged fact that belt conveyors provide the lowest-cost means for moving large volumes of bulk materials, but it was not until 1932 that belt conveyor engineers endeavored to adapt their established methods to the particular needs of the metal mining industry.

At that time ore production was virtually at a standstill and operators who were heavily stocked with materials handling equipment of the then conventional type, were hesitant to change their methods and invest in new equipment. Studies were continued, however, and a great many layouts were made for both underground and stripping operations, which eventually proved sufficiently convincing to bring about the first installation. To the name "Butler Brothers," pioneers in handling ore from open pits on belt conveyors, have now been added: "Copper Range"; "Interstate Iron"; "M. A. Hanna"; "Cleveland Cliffs"; "Oliver"; "Pickands Mather"; "Republic Steel," and others.

Today, open pits once considered "worked out" by previous methods, are being profitably developed with belt conveyors which require no spiraling ledge for transporting ore to the plant. No roadway or road bed is needed with belt conveyors, a feature which not only saves on maintenance but permits far deeper excavation before floor space becomes too limited for operation. And, when belt conveyors are installed, all of the valuable ore, formerly required for the spiraling ledge, may be fully recovered without the necessity of removing additional overburden. With the national accent on maximum tonnage—quickly—this gives belt conveyor handling a tremendous advantage that cannot be ignored.

The cost of any method of transportation depends, to a large extent, upon the distance covered, and this fact gives belt conveyors another big advantage. Belt conveyors travel over practically frictionless idlers directly from loading hopper to plant, usually in a straight line, and in the average belt conveyor-equipped pit, material is moved only from 5 to 6 percent of the distance required for the tedious run-around type of haulage, with a consequent saving in equipment cost, maintenance and power. In other words, run-around haulage usually covers from 18 to 20 times the distance required by belt conveyors and, in addition, conveyors travel much faster.

Another feature of belt conveyor transportation is that ore gathered by tractors and wagons, trucks, scrapers or any other method, is always moved downgrade to the loading hopper located on the pit floor. This gives the gathering equipment added capacity, saves on fuel and upkeep and speeds up handling, and, as the excavation deepens, it is a simple matter to add additional conveyor sections as needed.

Horizontal conveyors which discharge either into the main inclined conveyor or into a glory hole, may be installed on the floor of the pit to shorten truck haulage when distant points are being worked, and the entire belt conveyor system may readily be moved to a new location or to another pit.

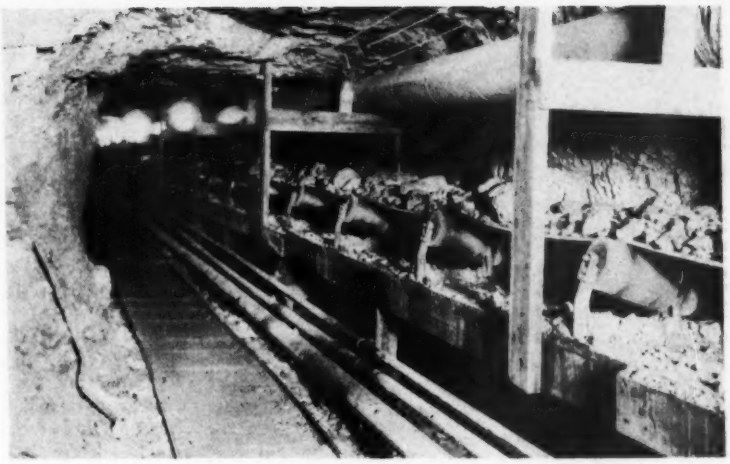
The same belt conveyor system which handles ore during the crushing season also can be used for the disposing of overburden during winter months, and probably such application will be made this year. This is

accomplished by bringing overburden to the regular truck loading hopper at pit floor, by spouting or otherwise, and elevating it over the regular system for disposal by dump cars or auxiliary conveyors as conditions require.

In the usual belt conveyor equipped operation, 15-ton trucks gather ore in the pit and deliver it to a dump hopper where the ore passes over vibrating or shaker screens for removal of fines and waste material, and into a primary crusher which reduces lumps to about 5 inches and under, and then over a feeder to the inclined belt conveyor. To protect the belt and prolong its life, fine material reaches the belt first and it is upon this protective bed that the heavier coarse material falls, and impact is further cushioned by rubber covered impact idlers beneath the belt.

The inclined belt conveyor is made up of independent sections, each individually driven, the length of which is determined by the tonnage to be handled and degree of slope. Thirty and 36-inch belt widths are those most commonly used on the iron range for capacities from 75 to 1,000 long tons per hour at belt speeds of between 500 and 600 ft. per min., but wider belts can be used where greater tonnage is required.

In selecting the belt it is important to keep the number of plies down to the point where the belt will trough properly without load. It has been general practice to use 42-ounce duck and to hold belt stress to 45 pounds per inch-ply, but certain types of belts can be stressed up to 70-lb. per inch-ply and still trough properly. The type of drive used has a direct effect upon belt stress.



Conveyor belts also serve to transport ores underground

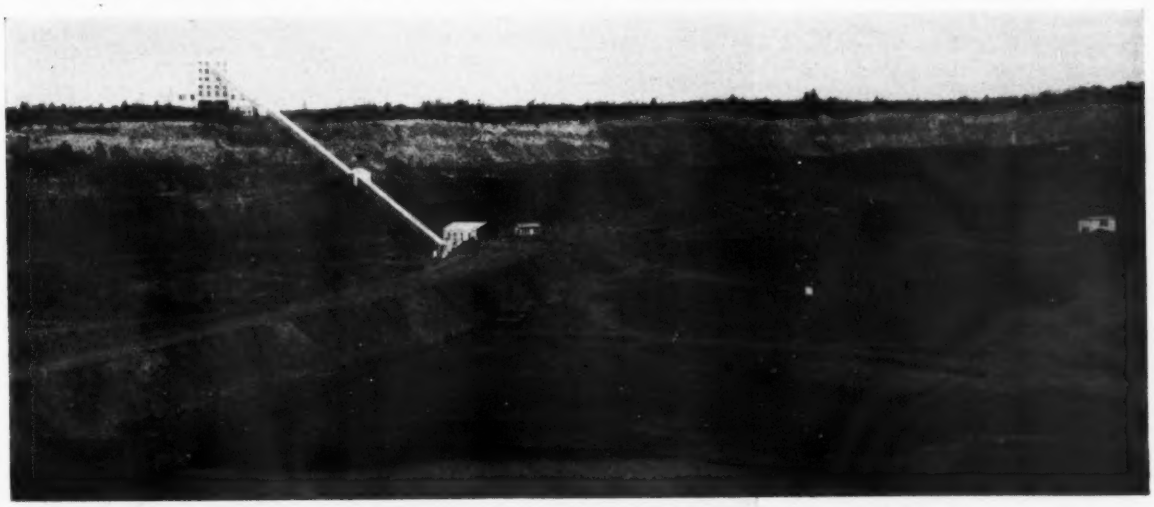
Belt idlers, should be of excellent quality, equipped with high-grade roller bearings for efficient operation and adequately protected from dirt and grit for long life. Among recent idler developments are the rubber cushioned impact idler for use at loading points, the rubber tread return idler and self-aligning idlers for both carrying and return runs which automatically train the belt for true-running regardless of loading conditions.

Because the ore handled may be wet or dry, coarse or fine, transfer points between sections of the inclined belt conveyor presented an interesting engineering problem and brought about an innovation in transfer point design. Possibility of ore clinging to the belt has been eliminated by the simple, yet effective, use of water sprays.

Space does not permit a detailed description of the various belt conveyor installations but a typical example is the Canisteo open pit at Coleraine, (MINING CONGRESS JOURNAL, May, 1941) operated by the Cleveland Cliffs Iron Company as agents for Canisteo Mining Company. Here, under the competent supervision of Max Barber, vice president in charge of operation; W. A. Sterling, general superintendent and L. C. Moore, chief engineer, a 1,000 ft. long belt conveyor system operating on an 18-degree slope from storage pocket in pit to top of concentrator building, has replaced railroad car transportation.

This inclined conveyor is made up

(*Continued on page 72*)



A recent view of the Canisteo iron-ore mine in Minnesota. Ore is hauled in 15-ton trucks to the crushing plant at the bottom and is conveyed about 1,000 ft. up an 18-degree slope to the top of the washing plant

COAL MINE BUMPS—I

● ***This is the first of two articles in which the author offers a comprehensive summary of data collected on the phenomenon of sudden bursts or failures in pillars, roofs or floors in coal mines.***

By CHARLES T. HOLLAND
School of Mines
University of West Virginia

THE action to be discussed in this article does not concern itself with the minor failures which go with the weight that comes on the pillars adjacent to a pillar line, although under the proper circumstances these may be the preludes to the more violent failures which are classed as bumps. Rather the action described herein refers to those sudden failures of the pillar and adjacent strata that may instantly produce anywhere from a few tons of loose coal and rock up to several hundred tons of loosened material, much of which will be finely broken. In addition to the loose material produced, bumps liberate energy in sufficient quantity to move heavy mine machinery, bend rails, and exhibit various other destructive effects. These phenomena have been known to occur in the Crow's Nest Pass coal field, British Columbia; Springhill, Nova Scotia; Washington State; Carbon County, Utah; Harlan County, Ky.; Wise County, Va.; McDowell and Logan Counties, W. Va.; Lower Selisian coal fields of Germany; in certain sections of Belgium, France, and the South Staffordshire Field of England, as well as other localities where deep mining is done.

Bumps have been classed as pressure and shock bumps,[1] also as local and district bumps. The pressure and shock bumps are so classed because of the manner in which they are supposed to be caused. The pressure bump is thought to originate from the slow loading of a coal pillar until the load exceeds the bearing strength of the pillar, when it abruptly fails. The shock bump, presumably, is caused by a heavily laden pillar being subjected to a blow or pressure wave induced by the rupture of a roof stratum or by some other means. This type of bump is thought to occur more frequently than the pressure bump, and is probably more disruptive and violent. The term local bump applies to the action which affects a comparatively small area, while the district bump affects a much larger area.

The effects of the bump are frequently peculiar, in one case a pillar is crushed, in another a pocket is shot out, and in one instance a hole has been torn completely through a pillar, forming an opening a man could walk through, and yet in another instance a series of round holes were shot out in the pillar much the same as if someone had shot explosives "on the solid." Timber is frequently knocked down, but considering the violence of the disturbances often comparatively

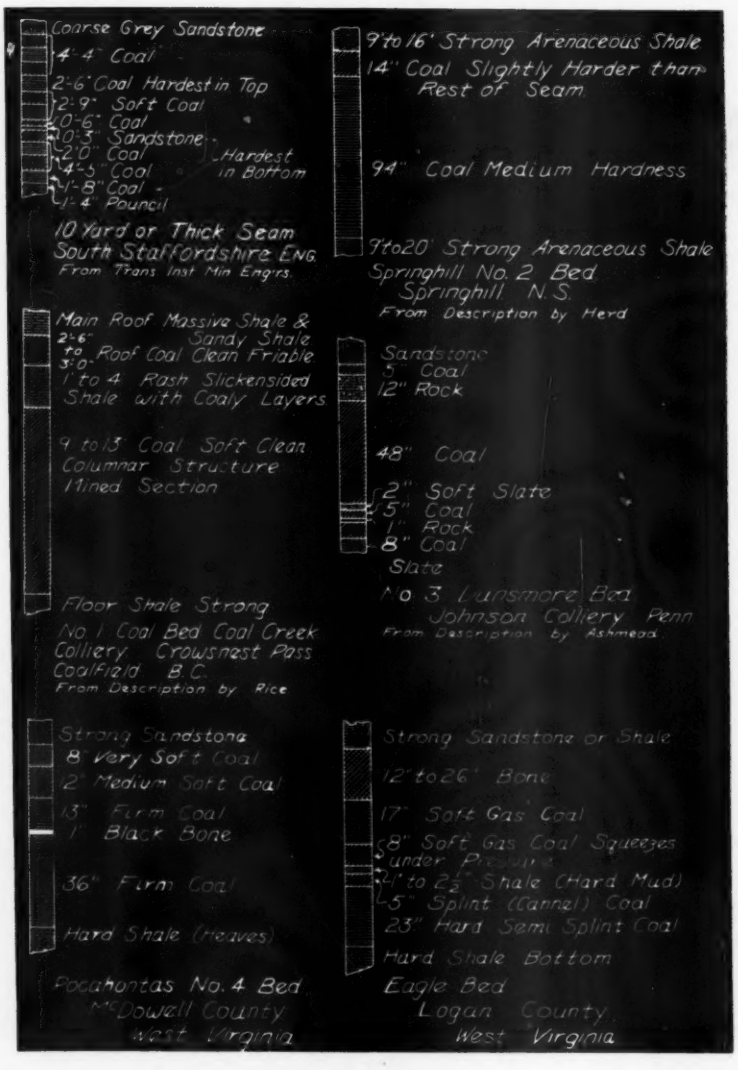


Fig. 1. Coal Bed Sections.

[1] G. S. Rice, Bumps in Coal Mines—A. I. M. E.—Vol. 119, p. 12.

TABLE I
DATA ON BUMPS IN COAL MINES

Location	Name of Seam	Strength of Coal: Roof	Strength of Coal	Strength of Coal: Floor	Thickness of Coal Bed	Cleat	Method of Mining	Depth of cover	Inclination of Bed	Methane Released by Bumps
South Staffordshire, England (1) Bit. coal	Thick coal or 10 yds.	Strong members	Weak and strong depending on the members	Strong	18 to 23 ft.	Pronounced	Square work and method of Fig. 11	1,500 to 1,900 ft.	2 to 4 deg.	Sometimes in in small volumes
Nova Scotia, Canada Springhill No. 2 Mine (2) (3) Bit. coal	No. 2	Strong	Medium strong	Strong	Avg. 9 ft.	Present but not well defined	Room and pillar also retreating longwall	1,900 ft. and deeper	30 to 20 deg.	Yes. Usually not more than would be given off by same quantity of coal in breaking
Crows Nest Pass British Columbia No. 2 Coal Creek Mine (4) Bit. coal	No. 2 and No. 1	No. 1 Main roof strong, Rash weak. No. 2 roof strong	Friable Soft, Columnar	Shale Strong shale	See sections	Yes, columnar	Pillar and stall	2,000 to 2,500 ft.	Approx. 10 deg.	Yes. Frequently in large quantities
Washington State U. S. A. Black Diamond Mine (5) Bit. coal	McKay??*	Strong	Strong	Weaker than roof	3½ to 5½ ft.	No information	Room and pillar	1,400 to 1,600 ft.	15 to 20 deg.	No infor.
Washington State Carbonado Mine (5) Bit. coal	Windgate	Strong	Strong	Strong	4 to 5 ft.	No information	Room and pillar	2,000 ft.	60 to 20 deg.	No infor.
Utah Sunnyside Mine (7, 8) Bit. coal	Sunnyside	Strong	Comparatively soft and brittle. Fairly weak	Strong	9¾ ft.	Yes	Room and pillar	1,500 to 2,000 ft.	Approx. 6½ deg.	No infor.
Pennsylvania Johnson Colliery (9) Anthracite	No. 3 Dunmore	Strong?	Strong?	Strong?	7 ft. including partings	No data	Room and pillar	700 ft.	5 deg.	None found
Cumberland Coal Field, Harlan County, Kentucky and Wise County, Virginia (10, 11, 12, 13, 5) Bit. coal	Harlan, Darby, Kellioka, Taggart	Strong	Strong	Strong	3¼ to 5 ft.	Well defined	Room and pillar	500 to 2,000 ft.	Practically flat	Explosive amounts in some cases. None in others
West Virginia McDowell County Semi-bit.	Pocahontas No. 4	Strong	Weak	Fairly strong but heaves	5 to 6 ft.	Present but not prominent	Room and pillar	600 to 1,600 ft.	Practically flat	No especial increase due to bumps
West Virginia McDowell County Semi-bit.	Pocahontas No. 4	Strong	Weak	Fairly strong but heaves	6½ to 7 ft.	Well defined	Block	600 to 1,400 ft.	Practically flat	No especial increase due to bump
West Virginia Logan County Bit. coal	Eagle	Strong	Strong and weak sections	Strong	5 ft.	Present but not prominent	Room and pillar	600 to 1,150 ft.	1 deg.	None noticed
Pendleton Colliery Lancashire, England (14)	Rams	Tough Shale		Strong	6 ft.	Present	Longwall using packwalls	3,000 ft. or deeper	18 deg.	Yes

* Identification of bed uncertain.

(1) The Occurrence of Bumps in the Thick Coal Seam of South Staffordshire. The Safe Working in Mines Committee of the South Staffordshire and Warrickshire Institute of Mining Engineers. Trans. Institute of Mining Engineers. Vol. LXXXV, p. 116 and following.

(2) Walter Herd, Bumps in No. 2 Mine, Springhill, Nova Scotia, A. I. M. E. Vol. 88, pp. 151 to 206.

(3) T. L. McCall, Further Notes on Bumps in No. 2 Mine, Springhill, Nova Scotia, A. I. M. E. Vol. 108, pp. 41-70.

(4) G. S. Rice, Bumps and Outbursts of Gas in the Mines of Crows Nest Pass Coal Field. Annual Report of the Minister of Mines (1917), British Columbia; pp. 327 to 353.

(5) G. S. Rice, Bumps in Coal Mines, A. I. M. E. Vol. 119, pp. 16-17 and 32.

(7) A. C. Watts, An Unusual Bounce Condition, Coal Age. Vol. 14, p. 1028.

(8) A. C. Watts, Coal Mining in Carbon County, Utah, *Coal Age*. Vol. 3, pp. 400-404.

(9) D. C. Ashmead, Bumps and Shocks Disturb Johnson Colliery, *Coal Age*. Vol. 26, p. 643.

(10) D. J. Jones, N. W. Wilden and John F. Maurice, Mountain Bumps in the Coal Field of Harlan County, Kentucky, Kentucky State Department of Mines and Minerals, Geological Division, Series VIII, Bulletin I.

(11) G. S. Rice, Bumps in the Coal Mines of the Cumberland Field, Kentucky and Virginia—Causes and Remedy, U. S. B. M., R. I. 3267.

(12) J. F. Bryson, Method of Eliminating Coal Bumps or Minimising Their Effects, A. I. M. E. Vol. 119, pp. 40-57.

(13) J. F. Bryson, Coal Bumps in Eastern Kentucky, *Coal Mining*. Vol. XI. pp. 44-45.

(14) Crumps at the Pendleton Colliery, *Colliery Guardian* (1927). Vol. 135, p. 533.

few timbers are broken.[2] An instance being on record of a bump closing, and partly closing a 9 x 12-ft. closely timbered entry, with rock falls, coal and other debris for 250 ft. without the breakage of a single timber.[3] In another instance a hardwood chock has been moved 10 ft. by a bump and left standing on a conveyor pan intact.[4] Several descriptions of bumps are alike in that they mention the small breakage of timber. However, in certain types of bumps (high side) at Springhill the timbers are often broken.[5] The main roof is rarely broken, although loose material is shaken down. The floor may or may not be broken. Earth tremors are produced and in the case of heavy bumps have been detected several miles distant from the source of the disturbance. Dense clouds of dust may be stirred up from the intensity of the shock and by the disturbance produced in the mine atmosphere. Explosive gas may be liberated either in large quantities or in quantities so small that none can be detected by ordinary means.

The dangers incident to bumps arise from: (1) The possibility of men being struck by flying objects or being injured by the shock and force of the "explosion." (2) Suffocation from being buried in the loose material produced, or by the gas liberated. (3) In cases where flammable gases are liberated a gas explosion may occur.[6] (4) Clouds of dust so dense sometimes are formed that a dust explosion might occur if a source of ignition were present.

The best protection against these dangers is to prevent the bump, because, once it occurs, there cannot be any sure protection against the first two sources of injury. A well-maintained ventilation system could do much toward preventing a gas explosion, although a bump has been known to liberate gas in such large quantities[7] so as to make it very difficult to dilute the gas to a nonexplosive point. Adequate rockdusting could do much to protect against the danger of dust explosion, although when large quantities of coal are broken, much fine dust is produced and rockdusting which ordinarily would be considered heavy might not be effective in preventing a dust explosion.

The natural conditions under which bumps occur are often quite similar in many respects, but at the same time many of the conditions show considerable divergence. To give in some detail the natural conditions under which bumps occur, Tables I, II and III are given, as well as a few sections of the coal seams (see Fig. I) in which disturbances of this kind have occurred. An examination of the tables above indicates that bumps have not occurred unless the cover is 500 feet or more thick. The main roof is generally classed as strong, although in places bumps have occurred where comparatively thin, weak beds lie between the coal bed and the strong members composing the main roof. The rocks composing the cover in several cases are predominantly sandstones and conglomerates, and the cover in other cases is reported to have heavy sandstone lenses present. The rocks composing the floor are usually classed as strong, although in three cases they are classed as weaker than the roof. In several cases the bottom

TABLE II
ANALYSES OF COAL BEDS IN LOCALITIES HAVING BUMPS

Location	Seam	Moisture	Volatile	Fixed Carbon	Ash
S. Staffordshire, England	Thick coal or[9] 10 yds.	11.2	32.1	52.5	2.3
Springhill, Nova Scotia	No. 2[10] No. 1	2.6	31.5	57.4	8.5
Crows Nest Pass, British Columbia	No. 2[1]	.94	23.59	69.24	6.23
Washington State, Black Diamond Mine	McKay??[8]	6.3	40.6	48.6	10.6
Washington State, Carbonado Mine	Windgate[7]	2.7	36.3	52.9	8.1
Utah, Sunnyside Mine	Lower Sunnyside[6]	4.0	38.0	51.3	6.7
Pennsylvania, Johnson Colliery	Dunmore No. 3[5]	1.9	7.1	79.2	11.8
Cumberland Coal Field Harlan County, Kentucky and Wise County, Virginia	Harlan[4] Darby[4] Kellioka[4] Taggart	3.0[5] 3.9[5] 2.6[5]	36.6 37.8 36.8	56.1 54.1 58.5	3.5 4.2 2.1
Logan County, West Virginia	Eagle[3]	1.6[4]	34.3	59.9	5.8
McDowell County, West Virginia	Pocahontas No. 4[2]	.45	15.46	78.80	5.29
McDowell County, West Virginia	Pocahontas No. 4[2]	2.00	16.62	75.08	6.30

[1] Robert Strachen, W. J. Dick and R. J. Lee, The Coal Mining Industry of Western Canada, p. 54 (1927).
[2] Bituminous Coal Producers Board District No. 7.
[3] Bituminous Coal Producers Board District No. 8.
[4] Mountain Bumps in the Coal Field of Harlan County, Kentucky, Kentucky State Department of Mines and Mineral Geological Division.
[5] Bump and Shocks Disturb Johnson Colliery, *Coal Age*. Vol. 26, p. 643.
[6] Analyses of Utah Coals, United States Bureau of Mines, T. P. 345, p. 31.
[7] Analyses of Washington Coals, United States Bureau of Mines, T. P. 491, p. 89.
[8] Ibid., p. 40 (not certain that this is bed in which bumps occurred).
[9] W. F. Clark and W. W. Hughes—A General Description of the South Staffordshire Coal Field, Trans. Institute of Mining Engineers, Vol. III, p. 33. This analysis very old.
[10] J. H. H. Nicolls and C. B. Mohr, Analyses of Coals and Other Solid Fuels. Canada Department of Mines and Resources, No. 779, 1934-1936; p. 12.

[2] J. F. Bryson, Coal Bumps in Eastern Kentucky, Coal Mining—Vol. XI, pp. 44 and 45.
[3] B. Caufield, Bumps and Outbursts at Crow's Nest Pass, British Columbia, Trans. A. I. M. E.—Coal Division (1931), p. 102.
[4] T. L. McCall, Bumps in No. 2 Mine, Springhill, Nova Scotia, Trans. A. I. M. E.—Coal Division (1930), p. 198.
[5] Walter Herd, Bumps in No. 2 Mine, Springhill, Nova Scotia, A. I. M. E.—Vol. 88, p. 180.
[6] In eastern Kentucky, gas has twice been ignited following a bump. J. F. Bryson, Method of Eliminating Coal Bumps or Minimizing Their Effects, Trans. A. I. M. E.—Vol. 119 (1936), p. 941.
[7] In 1908 a bump at Crow's Nest Pass is estimated to have liberated 3,000,000 cu. ft. of gas. B. Caufield, Trans., A. I. M. E., Coal Division (1931), p. 104.

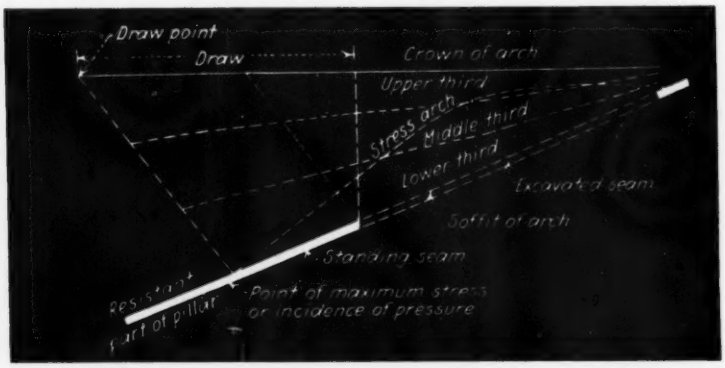


Fig. 2. Theory of high stresses thrown on pillar by action of a stress arch. (After, Hall, A.I.M.E., Vol. 108—pg. 65.)

TABLE III

GEOLOGICAL CONDITIONS UNDER WHICH COAL MINE BUMP S HAVE OCCURRED

Location	Roof	Terrain	Faults in General Location	Prominent Folds	Faults in actual bump area	Age of coal
S. Staffordshire (1) 10-yd. seam	Heavy sandstone members	Undulating to hilly	Yes	Yes	Not necessarily	Carboniferous
Springhill, (2, 3) Nova Scotia	Strong sandstone lenses	Mine under level ground	Yes	Mine itself on a fold	Small displacements in some case but not always	Carboniferous
Crows Nest Pass, (4) British Columbia	Sandstone and conglomerate members	Mountainous plateau	Yes	Yes	Yes, but not always at bump	Cretaceous
Washington State, (5, 1) Black Diamond and Carbonado	Strong sandstone present	Mountainous		Yes		Eocene
Utah, (6, 7) Sunnyside	Massive sandstone predominate	Mountainous	Yes	Yes	In some cases	Cretaceous
Pennsylvania, Johnson Colliery (8)	Predominately sandstone	Mountainous		Yes	No	Carboniferous
Cumberland Coal Field, (9, 5, 10), Ky. and Va.	Predominately sandstone	Mountainous	Yes (Measures now relieved of geologic thrusts)	Yes	No of actual	Carboniferous (Pottsville)
McDowell County, W. Va. Pocahontas No. 4	Predominately sandstone	Mountainous	No	No	No	Carboniferous (Lower) Pottsville)
Logan County, W. Va., Eagle	Predominately sandstone	Mountainous	No	No	No	Carboniferous (Middle Pottsville)

(1) W. F. Clark and H. W. Hughes. A General Description of the South Staffordshire Coal Field. Trans. Institute of Mining Engineers. Vol. III, pp. 10 to 25.

(2) Walter Herd, Bumps in Springhill No. 2. Trans. A. I. M. E., Coal Division, 1930.

(3) Francis W. Gray, Coal Fields and Coal Industry of Eastern Canada. Bulletin No. 14, pp. 21, 22 and 40. Canada Department of Mines.

(4) Robert Strachen, W. J. Dick, R. J. Lee, and Bernard Canfield. The Coal Mining Industry of Western Canada.

(5) G. S. Rice, Bumps in Coal Mines. Trans. A. I. M. E. Vol. 119, pp. 16 and 32.

(6) A. C. Watts, An Unusual Bounce Condition. *Coal Age*. Vol. 14, p. 1028.

(7) A. C. Watts, Coal Mining in Carbon County, Utah. *Coal Age*. Vol. 3, pp. 400-401.

(8) D. C. Ashmead, Bumps and Shocks Disturb Johnson Colliery. *Coal Age*. Vol. 26, pp. 641-643.

(9) D. J. Jones, N. W. Wilden and John F. Maurice, Mountain Bumps in the Coal Fields of Harlan County, Kentucky, Kentucky State Department of Mines and Minerals. Geological Division, Series VIII, Bulletin I.

(10) G. S. Rice, Bumps in the Coal Mines of the Cumberland Field, Kentucky and Virginia, Causes and Remedies, United States Bureau of Mines, R. I. 3207.

has been observed to heave. However, even in these cases the floor is still sufficintly strong and rigid so as to not afford a cushion which would effectively dampen a hard blow on the pillar. The coal bed is described as being strong in four cases and as weak or fairly weak in five cases. The coal bed sections (Fig. I) indicate that in several instances where bumps have occurred the coal beds have been composed of members which are regarded as being of different hardness and on some occasions rock or bone bands have occurred in the beds. It is also probably safe to assume that the coal bed or any member in it does not uniformly possess the same strength, hardness or elastic properties at all locations. Evidently the thickness of the coal bed is not a controlling factor because bumps have occurred in beds as thin as 3¼ ft. and as thick as 23 ft. A study of Table II indicates that bumps have occurred in coal beds having widely varying proportions of volatile matter, fixed carbon and ash. Evidently the chemical composition of the coal has little effect or gives little indication of the type of coal in which a bump will occur.

The geological conditions under which bumps occur vary. The pitch of the beds does not appear to be a controlling factor, as bumps have occurred in beds which are practically flat as well as beds that dip at high angles. The presence of faults does apparently increase the likelihood of bumps and on occasion appears to have been their direct cause. A very mountainous surface has been considered as a factor in the cause of bumps and many of the cases listed in the preceding table occurred under such a surface. In practically all the cases cited, ample evidence is present of the action in the past of large geologic forces and in some cases these forces could have been one of the conditions entering into the cause of the bumps which occurred.

The mechanics of the cause of bumps is not definitely known. Several theories, however, have been advanced to explain the origin and action of the forces producing the bump. Certainly the pressure bump and shock bumps are caused by different types of force action. The pressure bump is thought to be caused by a pillar failing from overload, as does a compression specimen when being tested. It is possible for the pressure bump, however, to occur under comparatively light cover because the action of the roof tends to cause high coal stresses in the pillar adjacent to a pillar line. This type of bump can occur in solid work when such work is under a thick cover or if techtonic forces from past geologic disturbances are present. Hall has ex-

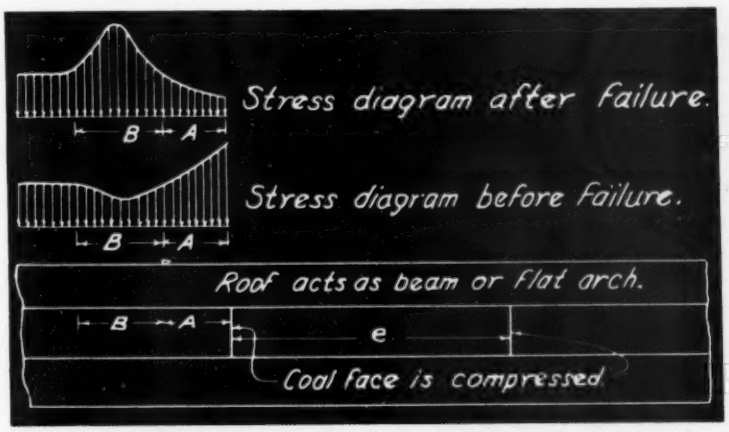


Fig. 3. Illustrating the impact stresses in coal beds due to failures of beams or arches. Note the stress is proportional to the vertical height of the stress strain diagram. The shock bump would occur in the area B at the instant the beam or arch failed. A pressure bump might occur in the area A before the beam or arch ruptures.

plained bumps as being caused by a stress arch being formed in the roof which throws high concentrated loads on pillars well back from the wall-face or pillar line. This stress causes bumps by pressure rather than shock. His theory is illustrated in (Fig. 2).

The sudden energy release that may cause the shock bump has been accounted for by the rupture of a strong roof stratum when it is acting either as an arch or beam. The mechanics of the action is illustrated in (Fig. 3), which is constructed partly from the description of Herd,[8] Rice,[9] and Mccall.[10] When the distance "c" is opened out by mining, it is usually spanned by the members of the roof, acting as flat arches or beams, for a distance up to several hundred feet, depending upon the strength and elastic properties of the members. The beam or arch will fulcrum in the area A, increasing the stress in this section. The stress in the area B will be reduced somewhat by the upward thrust of the roof which probably acts over the solid coal as a beam. Actual re-elevation of the roof has been observed in this area by Winstanly,[11] McCall,[12] Holland,[13] and Greenwald.[14] This re-elevation of the roof is aided by the fact that the coal is elastically compressed. Since the elastic force of the coal is held in exact equilibrium by the weight of the roof, any relief of load, no matter how slight, will cause a slight re-elevation of the roof. The roof members will, of course, be elastically stressed and at the instant the arch or beam spanning the mined area ruptures, a rebound will follow which may cause tremendously high stresses in the area B. If the strength of the pillar is not sufficiently great, the blow from the rebound and resultant stresses, therefore, will fail it instantly. It should be noted that in a 50-in. seam the actual total vertical motion in the area B probably would not amount to as much as 1 in., assuming the strength of the pillar to be 10,000 lbs. per square inch and that it has an elastic modulus of 600,000 lbs. per square inch, neither of which on the basis of experiment is unreasonable if the pillar is long and wide compared to its thickness. After the failure of the first span, the bump may be caused by the members of the roof acting as a cantilever beam or possibly by the failure of the inverted arch in action such as Bucky[15] observed in model study.

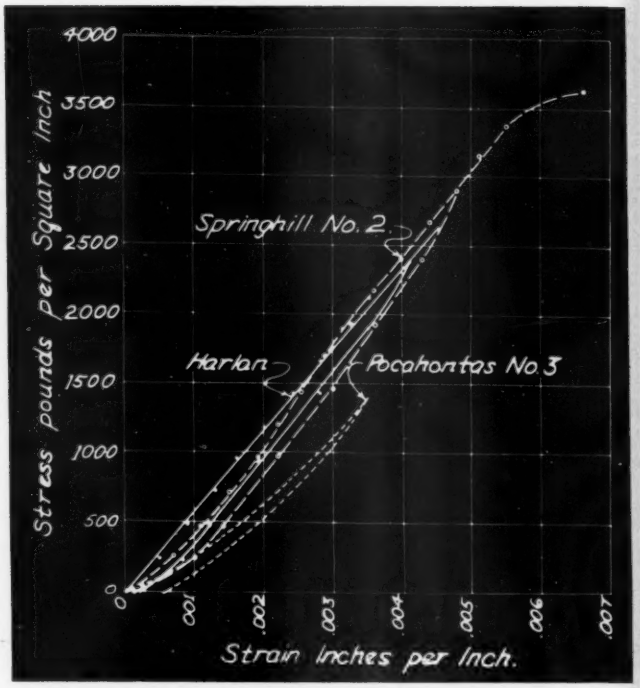


Fig. 4. Stress strain curves of coal. The Harlan No. 2 from Springhill are from beds which have developed bumps. The Pocahontas No. 3 is similar in many respects to the Pocahontas No. 4.

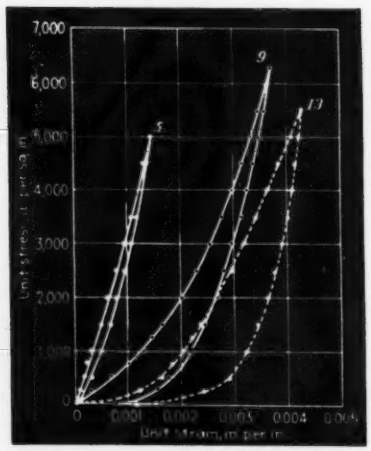


Fig. 5. Stress-Strain Relationship of Various Rocks from Middle Pottsville Coal Measures. Curve 5 is for a gray curly shale. Curve 9 is for a white sandstone with brown pebbles cemented in it. Curve 13 is for a banded gray sandy shale

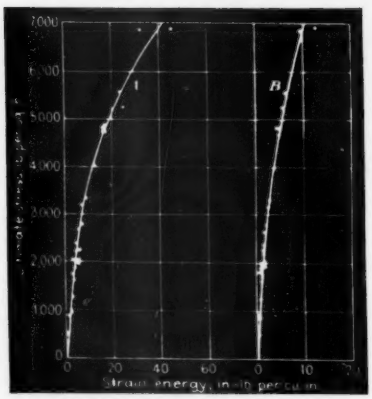


Fig. 6. Strain Energy Stored by Coal. Each point is the average of determinations made on two to four specimens. Strain energy values for stresses less than 1,000 lb. per sq. in. calculated from Greenwald's experiments on small mine pillars. Curve A shows the energy estimated to be stored when the coal is stressed to its ultimate strength. Curve B shows the energy stored when the coal is stressed to one-half its ultimate strength. (After, Holland, A.I.M.E.—T. P. 1406)

This article will be concluded in the July issue.

[8] Walter Herd, Bumps in Springhill No. 2, A. I. M. E.—Vol. 88, p. 178.

[9] G. S. Rice, Bumps in Coal Mines of the Cumberland Field, Kentucky, and Virginia—Causes and Remedies. United States Bureau of Mines, R. I. 3267, p. 4.

[10] T. L. McCall, Further Notes on Bumps in No. 2 Mine, Springhill, Nova Scotia, A. I. M. E., Vol. 108, p. 59.

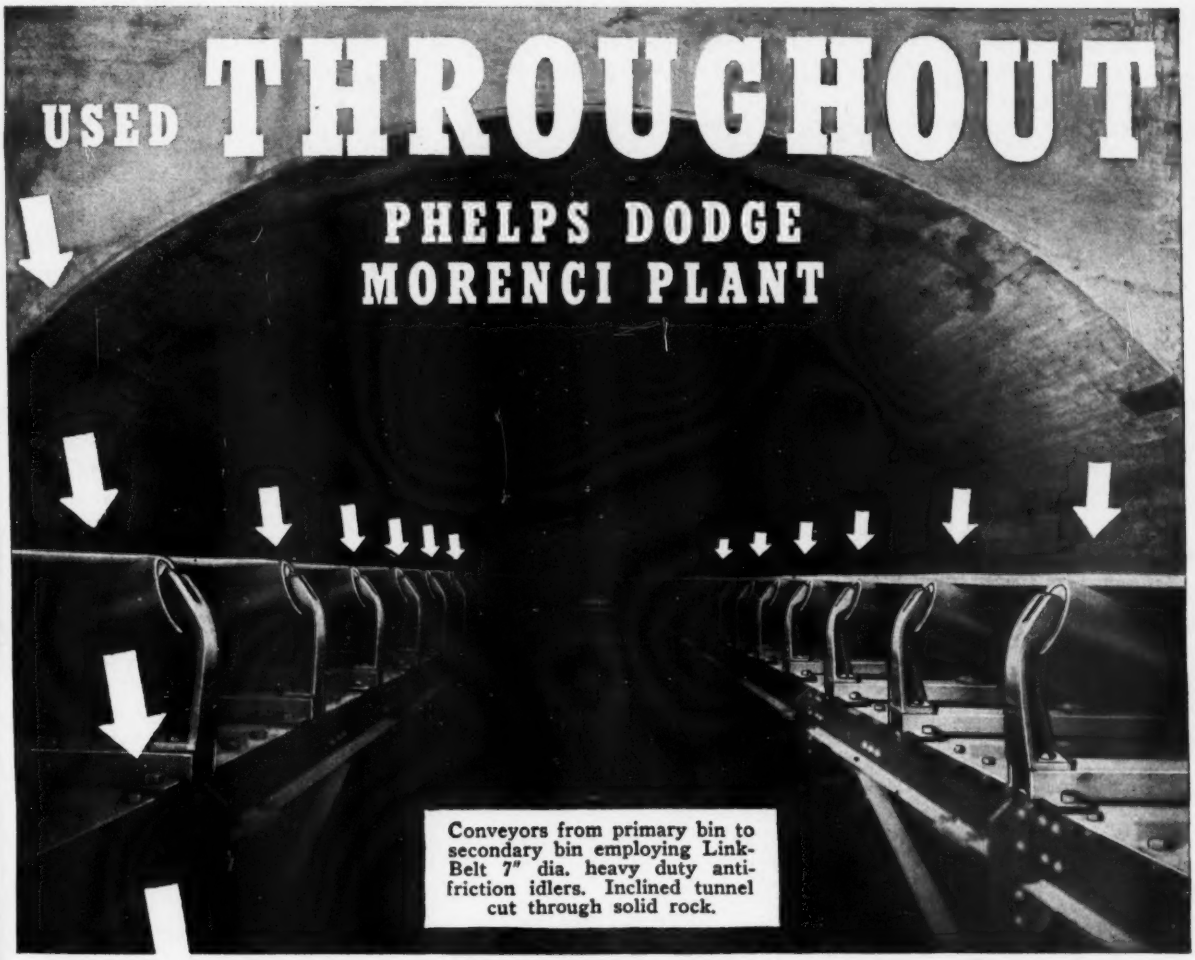
[11] Colliery Guardian (1931)—Vol. 142, pp. 746 and 2224.

[12] A. I. M. E.—Vol. 108, p. 51.

[13] A. I. M. E.—Vol. 130, pp. 341 and 342.

[14] United States Bureau of Mines, R. I. 3355, p. 13.

[15] A. I. M. E.—Vol. 139, p. 222.



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By JULIAN D. CONOVER, Secretary
American Mining Congress

THE American Mining Congress, representing the combined mining industries of the United States, and including in its membership companies which produce approximately 85 percent of the domestic output of the mineral commodities and derivatives, (listed in the box), respectfully requests that no reductions be made in the existing duties on these products in the pending trade agreement negotiations with Mexico and Bolivia.

These mineral products are highly important to our industrial system and standards of living in times of peace; they are of critical importance in the present war program. The specific uses of each commodity, and the statistics of production, imports, consumption, etc., are readily available to you in reports of the Tariff Commission and Bureau of Mines, as well as in statements filed with respect to individual commodities. We merely wish to emphasize that these materials are basic and indispensable in the manufacture of munitions, and that in most cases vastly larger quantities are required today than ever before in our history. It has been aptly stated that "metals are the muscles of Mars," and the entire production program upon which our national safety depends would bog down were the supply of these mineral products to be inadequate.

We assume that your Committee's consideration of the pending trade agreements is based primarily on the one supreme objective of winning the war. The mining industry's efforts are being devoted without stint to that end, regardless of margins of profit, exhaustion of ore reserves and other factors which would ordinarily play an important part. We realize keenly that if there is no victory, there is no post-war period for any of us to be concerned about. At the same time, many of the conditions required if the industry is to be maintained in a healthy and vigorous state after the war are equally required if it is to function efficiently during the war years in supplying the metals and minerals so urgently needed.

As to most of the mineral products listed, our country is fortunate in having large resources which have been developed over past years as a result of our national policy in providing reasonable protection against cheap foreign competition. Mines cannot be developed over-night, but require years of effort, prospecting, exploration, development, metallurgical research, and the investment of large sums both in opening up the ore deposits and in providing the physical plant and equipment. The moderate tariff rates established in the 1930 Act have been a factor of great importance in making it possible for our country to enter the present world conflict with a reasonable degree of self-sufficiency as to many of these minerals.

The statement on these pages was presented to the Committee for Reciprocity Information and the State Department, now negotiating trade agreements with the republics of Mexico and Bolivia. Mineral commodities listed for possible concessions in duty in such agreements include:

Antimony; fluorspar; graphite or plumbago; lead-bearing ores, flue dust and mattes; lead bullion, pig lead, lead dross, scrap, and lead alloys; molybdenum ore or concentrates; quicksilver; tungsten ore or concentrates; zinc-bearing ores; zinc in blocks, pigs or slabs; zinc dust; zinc in sheets; old and worn-out zinc, zinc dross, and zinc skimmings; zinc oxide and leaded zinc oxides; zinc sulphate.

We submit that the present is no time to change that policy nor to tamper with the modest rates of protection now enjoyed by the mineral industries.

We distinguish sharply between:

(A) Proposals to reduce or remove tariff duties for the period of the war and as a means of expediting war production (such, for example, as are reported to have been under discussion by the Joint Canadian-American Commission and at the Rio de Janeiro Conference); and

(B) The type of duty reductions which have been made under previous trade agreements and are apparently contemplated in the proposed agreements with Mexico and Bolivia. Such reductions, made usually for a term of three years, but continuing indefinitely thereafter unless one of the signatories gives six months' notice of cancellation, are for all practical purposes permanent in nature.

As to (A), we would not for one moment oppose any action which would help in winning the war. We doubt that reduction or removal of duties is needed for this purpose. We understand that large quantities of ores, metals and other products are being imported by the Metals Reserve Company for the Navy Department, under a 1914 statute which granted such authority; in fact, Mr. Jesse H. Jones testified to that effect before the House Committee on Banking and Currency on September 16, 1941.[1] We also understand that the government has the necessary authority and is proceeding to make such purchases of foreign ores, minerals and metallic products at such prices as it deems expedient. This is demonstrated by the announcement of the Secretary of

[1] See Congressional Record, October 7, 1941, page 7896.

Commerce on April 30 that arrangements had been made with the Mexican government whereby the Metals Reserve Company will "purchase for the period of the agreement copper, lead and zinc in metallic form or in ores and concentrates imported into the United States at prices which should give a stimulus to increased (Mexican) production." Even though our government or its agencies are required to pay import duties on such purchases, it is obvious that this is purely a bookkeeping transaction, whereby the amounts paid as duties are merely transferred from one government pocket to another.

Notwithstanding all this, if there should be definite benefits to the war program from the reduction—or even the complete elimination—of import duties on products of the mining industry for the period of the war, we would interpose no objection to such action. We do feel strongly, however, that *any such curtailment of our protection should be explicitly and positively limited to the period of actual hostilities, and that it should automatically terminate and the present rates of duty should again become effective immediately at the close of the war.*

As to (B) above, we are strongly opposed to any change in duties on our products such as are customarily involved in foreign trade agreements. Agreements with Mexico and Bolivia, if drawn up in the usual form, would provide indefinite continuance into the future of any reductions in tariff rates, and would thus seriously threaten domestic producers with low-cost foreign competition in the post-war period. The effect of any such duty reductions on mineral commodities would inevitably be to discourage new and increased production of these minerals within our own borders, through a realization on the part of prospectors, would-be producers, and investors that following the war they could not expect even the moderate protection accorded in years past.

The vital importance of developing our own mineral resources—of securing the maximum production within this country with the least possible dependence on transportation from abroad—is demonstrated by the many measures taken by the war agencies to stimulate domestic output. Premium prices are being paid for new or "overquota" production of copper, lead and zinc. A high official of the War Production Board recently told a Senate Committee[2] that some 300 government engineers and geologists are combing the country to seek out and bring into production new ore bodies; that some 40 major mineral projects are going ahead under government auspices, and that over $400,000,000 of government funds are being devoted to mine development and the building of plants to process the needed minerals. In this work, he stated, the dollar sign has virtually been wiped out, and the primary consideration is the obtaining of sufficient materials at the earliest possible date.

But government effort alone, even on this enormous scale, cannot do it all. The history of the mining industry shows that new discoveries and developments have primarily been the work of a great army of prospectors, explorers, small miners, engineers, scientists, and investors, spurred on by the incentive of creating new wealth and of sharing in the wealth thus created. This applies both to the finding of new ore bodies and to the development of new metallurgical processes to recover the values from low-grade or refractory ores. The efforts of private individuals and groups in this field are more urgently needed today than ever before. The incentive for such efforts should be preserved. It should not be stifled by commitments on the part of our government which would let down the bars to low-cost foreign minerals for an indefinite future period, and would thereby tend to destroy any hope of recovering investments or receiving a return in the years to come.

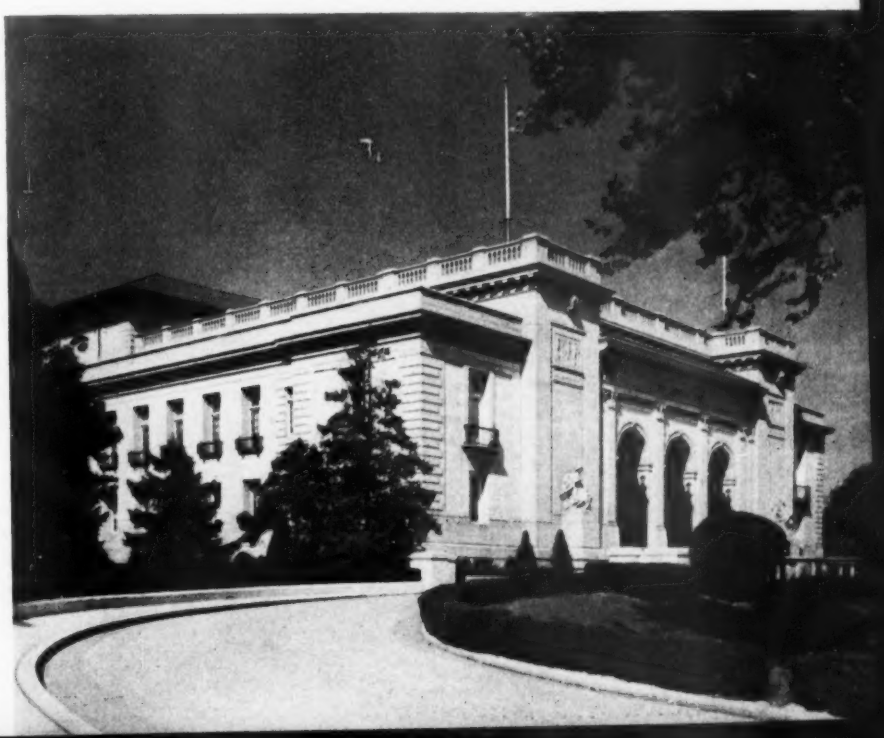
Let us make it plain that there is no lack of all-out effort by the mining industry in providing the sinews of war. Existing mines are being depleted without regard to accepted business principles, and operating companies are undertaking new enterprises where there is little or no hope of any real profit. We cannot expect, however, that those who might venture into the mining field—and particularly those who might seek out and develop the many small mines, which in the aggregate will produce important tonnages and from which must come the large producers of tomorrow—will risk their all in the face of a government policy which destroys the hope of survival in the post-war period.

The discouraging effect of tariff concessions made to any particular country is multiplied by the "most favored nation" clause, under which the same concessions must be extended to practically all other nations. In many of these countries the ore bodies are of much higher grade than those in our mines, as is brought out more fully in statements submitted to you dealing with individual mineral commodities. Wage rates and labor costs

[2] Testimony of W. L. Batt, head of the Materials Division, War Production Board, before the Senate Special Silver Committee, May 6, 1942.

(*Continued on page 71*)

The substantial Pan-American Building in Washington is symbolic of the enduring unity and understanding of problems sought by nations in the Western Hemisphere



USE CARE IN SOCKETING ROPE!

By F. L. SPANGLER
Chicago, Ill.

A WIRE rope with socket and hook attachment at the end was being used to pull a heavy object, the rope having been placed around the load to be pulled, with the free end hooked over the rope to form a choker hitch. The slack in the rope was taken up and a pull given on the rope by a power winch, when the rope pulled out of the socket. In straightening out, the rope acted much as a sling shot, throwing the socket and hook with considerable force, striking a workman and inflicting a serious head injury.

Obviously, the socketings had not been properly done. Even if the socket had held but the rope had broken near the socket, which might happen because of being cut or severely bent by a sharp edge of the load, the free hook and socket still might have been tossed a considerable distance with a great deal of force.

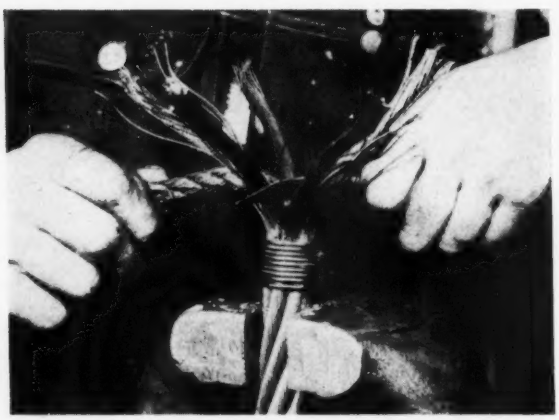
As long as the hook is free to fly off the rope, much as a bent pin is shot from a rubber band stretched between two fingers, such accidents are likely to happen should the socket attachment pull loose or the rope part in two near the hook. This can be prevented by using a hook with a safety snap or some other attachment that, should it come loose, will not leave the tight side of the rope over which it is hooked.

As to the socket attachment itself, it is unwise to allow rope to be socketed without proper supervision, for a poor socketing job may develop as low as 25 percent of the strength of the rope, and a visual inspection will seldom reveal the quality of the work.

Briefly, maximum strength is obtained in a socket attachment by following this procedure, as shown by the photographs and their respective captions.

1. Measure back from the end of the rope a distance equal to the length of the tapered basket of the socket

2. Tie securely at this point with soft iron annealed wire and add two additional tie wires below the first



3. Open up the strands and cut out the hemp core as far down toward the tie wire as possible

4. Unlay each wire and straighten so as to form a "brush." On large ropes, a small pipe can be slipped over the ends of wires to straighten them

5. If the wires are very greasy, hold the "brush" over a pail of gasoline with wires down and wipe off the grease with waste or with a paint brush dipped in the gasoline. Wipe dry

In socketing rope, it is of extreme importance that the lay of the rope not be disturbed below the seizing, and that the rope be in direct line with the axis of the socket.

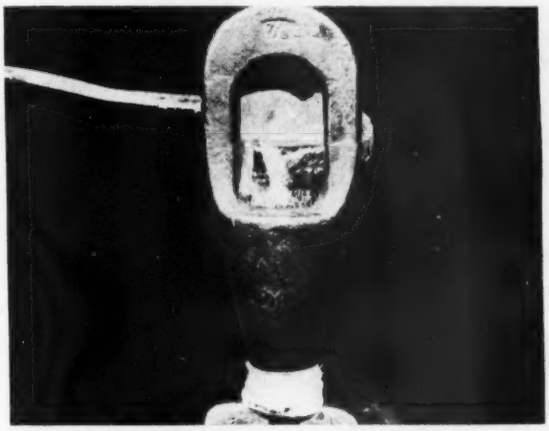
Disturbing of the rope lay is not so apt to happen with preformed rope, since the position of the strands in this rope is a natural one, made so by the presetting of the strands to this shape before they are closed onto the rope center.

The temperature of the zinc should not be so great as to reduce the strength of the wires by annealing. If the zinc is at the proper temperature, a soft pine stick dipped into the zinc and quickly withdrawn will have no zinc adhering to it and will be only slightly discolored by scorching.

Babbitt, lead and other soft metals are not recommended for socket fastenings because they develop less strength than zinc. However, one company who has tested basket fastenings report that where the rope wires are tinned, babbitt and other alloys have given strengths at least equal to that of the rope.

6. Dip the "brush" into a pot of muriatic acid solution (half water and half commercial acid). Don't insert so deep as to get any acid on the hemp core. Keep in the acid until the wires are clean. Still holding the wires down, withdraw from the acid and knock the rope sharply with a stick or dip the wires in boiling water containing a small amount of soda to neutralize the acid

7. Set the rope vertically in a vise, and set the socket so the wires come flush with the top of the basket of the socket with the wires spread out. Seal the bottom of the socket with clay, putty, or a strip of cloth



8. Pour the basket full of pure molten zinc. Tap the side of the socket with a light hammer while the zinc is still fluid, so as to jar the zinc into any crevices between the wires. A small amount of sal ammoniac crystals put on the wires will help the zinc to flow among the wires while pouring

9. When cool, remove the clay plug putty or strip of cloth and the serving wires. The socket type of fitting does not permit of visual inspection. The condition of the installation is revealed only by conducting a tensile test on the rope and fitting, or by sudden failure. Where failure of the socket fitting would imperil life and property, making of such joints should be carefully supervised to insure that they are properly done

This large gathering of operators and manufacturers at one of the luncheon meetings was addressed by Dr. Wilbur Nelson, Administrator of the Mining Branch, War Production Board

ECHOES FROM THE COAL CONVENTION

● ***Pace of the industry quickened as meetings clarified the priorities situation for operators and manufacturers and afforded them broader understanding of wartime problems.***

THE first coal convention during second World War will be remembered because it was the first meeting at which there were no exhibits of coal mining machinery and supplies. Operators and manufacturers, however, did accomplish many constructive things for the industry during the two-day session, April 27-28 at the Netherland Plaza Hotel, Cincinnati. In this issue the highlights of the war-time addresses of the convention are amplified and abstracts of the operating papers are given.

One of the perplexing problems of the industry is loss of labor to the military service and to the defense industries. This situation was discussed by W. B. Geise, of the Susquehanna Collieries Company, Nanticoke, Pa. He described this situation as it is being experienced in the anthracite region. He pointed out that a questionnaire submitted to the six largest operating companies disclosed that, prior to February 1, 1942, there were 1,405 men lost to the military service and 2,860 to defense plants. In the latter group a number were employed by local defense plants, while others have moved their families out of the States, the largest numbers going to Connecticut and Maryland. A fair estimate of the entire anthracite industry would show that, from a total of approximately 89,000 employes, about 2,500 have entered military service, and 4,500 have been absorbed by defense plants. Vocational training and the upgrading of men is having an important role to offset this trend. Defense training classes in shop work have been conducted by one company and, to date, 300 men who received this instruction have secured employment in defense work. Throughout the region, as a whole, no special effort has been made to train men for the defense industries. However, men are continually being trained to do shop work which qualifies them for defense jobs, if they decide to leave their present employment. Several of the companies have conducted night classes in mining engi-

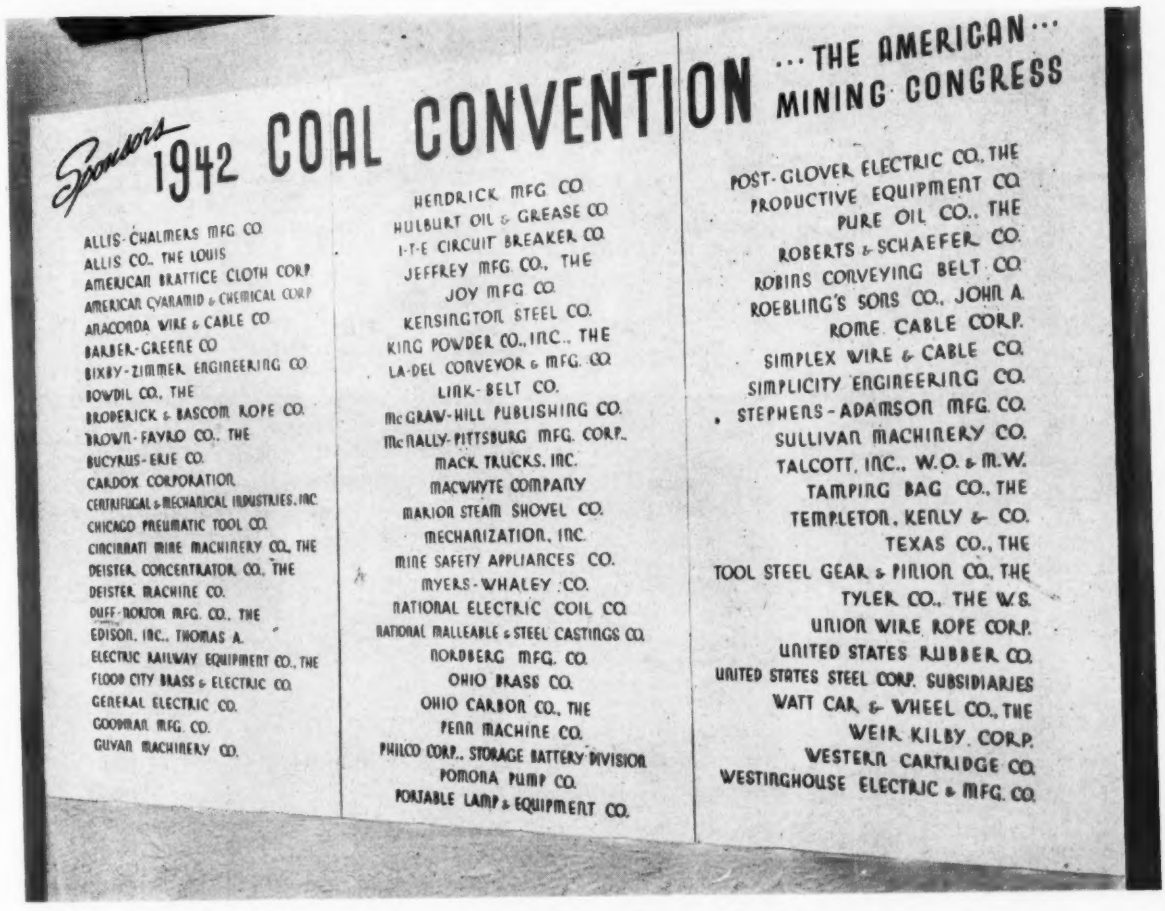
neering, mechanical engineering and fuel technology during the past 25 years, and at present one of the companies is continuing this practice. Many of the companies are shifting ambitious young men from one department to another, in order to give them practical experience to qualify them for jobs as foremen and superintendents. The general policy throughout the anthracite region is to have a man trained, whenever possible, for each key man position.

The number of available miners, who are experienced, and who possess all the necessary qualifications, is limited, inasmuch as the old type miner, of intelligent Welsh, Irish and English descent, is gradually being displaced by men who do not possess the same natural ability to grasp mining problems. The outlook for the future regarding the labor situation, including white collar workers, is dependent entirely upon the duration of the war. Mr. Geise closed his remarks by saying: "The anthracite industry has been confronted with many difficult labor and technical problems throughout the years of its existence, and has confidence, based on past experience, that a satisfactory solution will be found to cope with any new problems incident to the war effort."

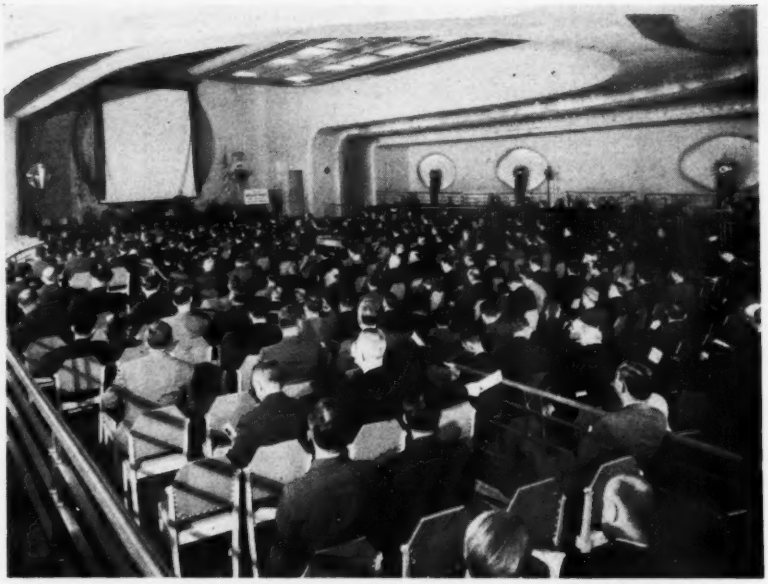
At the luncheon meeting on April 28, Dr. Wilbur A. Nelson, administrator of the Mining Branch, War Production Board, addressed a large gathering of manufacturers and operators. Dr. Nelson was introduced by John W. Haddock, vice president, Sullivan Machinery Company, and chairman of the Manufacturers Division, American Mining Congress. Some excerpts from the talk by Dr. Nelson follow:

"Unless we have complete cooperation between the Mining Branch of

J. W. Haddock, Chairman of the Manufacturers Division, American Mining Congress. Mr. Haddock is vice president of the Sullivan Machinery Company, Michigan City, Ind.



This list of manufacturers and companies sponsored the 1942 Coal Convention of the American Mining Congress. All of them had to forego exhibits of their machinery and supplies because of the national emergency



Attendance was heavy at the first general meeting in the Pavillon Caprice of the Netherland Plaza Hotel. J. Noble Snider heads the rostrum

WPB, between the makers of mining machinery and between the mine operators, we cannot hope to succeed in putting over the President's war program, and unless the mining industry, the three phases of it that I mentioned, do cooperate 100 percent, I do not believe that program can go forward as it should. I have always felt and today feel, that mining and munitions go hand in hand and should have the same high priority; and we must put mining in that class.

"There are a number of ways in which you can cooperate. First, in seeing that wherever we can make substitutions of less critical material for critical materials, we make such substitutions. I was told this morning that one mine was using coat hangers for welding rods. Another way in which we can cooperate is in balancing our inventories. That applies more to the makers of mining machinery than it does to mine operators, but perhaps they can do some of that themselves.

"The mine order known as P-56 is the one that most of you are interested in at the present period. That order, as many of you know, gives you for an emergency breakdown, the highest rating we have, an A-1-a rating, which today may be extended on that level by your suppliers. We have a new rating, an A-1-c rating on repair parts on the dollar quota basis per quarter. That A-1-c rating on repair parts can be extended by the mine operator to a supplier without clearing through Washington. The emergency breakdown rating must be cleared through the Mining Branch in Washington. We also have the old A-8 rating for supplies, when you need a rating to purchase them and finally, we have put in an A-10 rating for office supplies, which was not in the order before it was amended."

Speaking to the mine operators, Dr. Nelson said that for the third quarter of this year they would have to furnish data regarding their needs in raw materials, so they could be lumped together in an attempt to get the rating needed or the allocation required to get those raw materials. "Materials are getting tighter and tighter, but we hope by getting our facts in regard to the mining industry marshalled and in perfect form, before the facts are marshalled and in perfect form for other industries, to be able to continue to give you the assistance you need for this industry, which is an industry equal to the munitions industry and should go forward without any undue delay."

Recent steps taken by the Bureau of Mines in cooperation with the FBI to protect mining property makes the address of Mr. Quinn Tamm, Chief of the Identification Division, Federal Bureau of Investigation, U. S. Department of Justice, of particular importance at this time. Mr. Tamm said in part: "Many complaints come from law-abiding citizens throughout the nation, anxious and ready to help in the war effort. It is imperative that patriotic organizations impress upon their membership the absolute necessity of promptly reporting to the FBI any matters dealing with espionage, sabotage or subversive activities. Citizens are in a position to be eyes and ears for those of us vested with investigative authority in these matters. The FBI has over 2,900 agents in 56 offices throughout the continental United States, in Alaska, Hawaii and Puerto Rico, and there are many times when citizens receive information

Seated at the banquet table left to right—Admiral Hart, Harry M. Moses, and J. Noble Snider

which will materially aid us in bringing to a successful conclusion cases vital to our internal security.

"I desire to point out, however, that no citizen should attempt to evaluate and investigate information dealing with national defense which comes to his attention. It is not meant by this that the FBI expects every wild rumor caused by a whispering campaign to be referred for investigation. All too frequently in the past, whispering campaigns have been inaugurated, either through malice or lack of foresight, against individuals who may have immigrated to this country from totalitarian nations. Such are undemocratic, to say the least. We must not forget that many of the outstanding leaders of our time need go back but a few generations to find their ancestors leaving foreign shores in search of the liberty and freedom which our country offers to all.

"Incalculable harm may be done by the amateur investigator to the rights and reputations of persons entirely innocent of un-American activities. On the other hand, a person under suspicion might actually be an individual engaged in espionage or sabotage. He may have been under investigation by the FBI for many months. As the result of the activities of unauthorized individuals he might possibly become aware that his actions are the subject of investigation. Thereafter these activities would either be transferred to another area or discontinued entirely and the possibility exists that one and possibly two years' work of investigative agencies might have been wasted. Although thousands of sabotage complaints have been received by the FBI, the vast majority, upon investigation, have been found to be industrial accidents.

Admiral Hart with A. W. Dickinson on his right and Julian D. Conover on his left discussed some phases of the international situation

Q. Tamm, chief of the Identification Division, Federal Bureau of Investigation

"If ever in our history we needed unity, that time is now—unity of thought, deed and action; a solid wall of opposition to foreign ideologies; a united, sane and coordinated effort against subversive elements and foreign propaganda. There are many among us who would destroy the liberty we enjoy; many who would do anything in their power to defeat our war effort.

"I have seen a number of posters originating in England, which leave one very important thought. There are only four words appearing on these posters, which consist of two scenes. The top scene usually shows a soldier, sailor or member of the air corps departing for service—family, friends and neighbors standing in the background. Above that in large letters are the words "THEY TALKED." The lower scene usually shows the sinking of a vessel, captioned with the words, "HE DIED."

"We should ever keep it uppermost in our thoughts that heedless talking, the passing on of rumor or of tales, may ultimately result in the defeat of an army. Eternal vigilance is the price of liberty. If we desire to retain that liberty we must keep ever watchful to insure that even though it cost us our lives, liberty will continue to be the heritage of our children, and our children's children."

Abstracts of the operating papers begin on the following page. Complete proceedings of all meetings will appear in the 1942 Coal Mine Modernization Yearbook.

Operators concerned with the various problems of strip mining found maintenance of equipment and supplies among their leading interests

Face Preparation

Cutting, Drilling and Shooting

By F. EARLE SNARR
Assistant to Gen. Supt.
Chicago, Wilmington & Franklin Coal Co.

MANY OPERATORS WILL agree that possibilities exist for improvement in face preparation practices. In approaching the subject from the angle of improvements as related to our national war effort, it is difficult to divide the subject and classify the benefits of standardized face practices because that which gives valuable improvement to coal for use in war industry, directly or indirectly, may at the same time benefit the mine operation equally as much. Physical characteristics of the coal seam, manner of loading and types of loading equipment used, market requirements or the purpose for which the coal is to be utilized all have a bearing on what is desired and how it can best be accomplished.

Mines located in Franklin County, Illinois, operated by the Chicago, Wilmington & Franklin Coal Co., have coal that runs from 8½ ft. to 12 ft. thick, with an average of 9 ft. at the particular properties being discussed. Between 7½ and 8 ft. of this is mined, leaving top coal above a natural parting for protecting the roof slate.

All coal at these mines is undercut leaving a thin bottom of coal protecting the underlying fire clay until loading operations are completed. As the track is advanced these coal bottoms are taken up track width so that track can be laid directly on the clay. Coal is loaded with mobile loading machines of both the crawler tractor and track-mounted types. Most of the tonnage is undercut by universal type track-mounted machines but a number of shortwall undercutters are still in use at each mine.

From a program of study in face preparation facts were determined to set up the standards adopted. When it was proven that these standards permitted the loading machine to load as much coal as would balance the capacity of the other mining units, sketches and instructions were issued to the foremen. These have not been changed except in minor detail over a period of several years. No doubt some are ready to ask the question many of the face men asked, "Who ever heard tell of shooting coal with a blueprint?" The answer is "it is the *only* way we could find for obtaining standard results." The so-called blueprint is based on proven facts, obtained by collecting and testing the widely divergent preferences and opinions of the miners, foremen and engineers. A certain amount of technical knowledge mixed with an equal amount of horse-sense simplifies the matter of selecting the opinions worth testing and recognizing the facts when found.

Cutting, drilling and shooting constitute a three-man team and unless they function properly, all phases may appear to be wrong. Equipment used in cutting at these properties consists of the late type universal track cutter, the earlier track-mounted, arc-shear type, and a few remaining units of shortwall type. Sixty-five percent of the tonnage is cut with one of the track type machines equipped with 9-ft. cutter bars and using nine position chains which cut a kerf of about 6 in. The lacing pattern of these chains was developed locally to give least possible amount of minus 10-mesh dust in the cutting. Coal undercut with track cutters is also sheared vertically from roof to bottom either in the center or near the center of the place.

Drilling at these mines is done with post-mounted electric drills. Mole-foot cutter heads and double-end bits that permit drilling speed and coarse cuttings are employed exclusively. Both the twist auger and the auger constructed with a helix welded on a straight tube are being used. The latter type costs more but its splendid performance has offered sufficient data for standardization.

Drill motor trouble has been materially reduced through use of this type auger. Being more rigid it can have a conveying helix more nearly the outside diameter of the cutting head and it clears the drill cuttings from the hole so thoroughly that little, if any, scraping is necessary.

Hard surfacing the outer edge of the helix for the purpose of reducing wear and extending the life of the auger indicates it is going to justify the additional cost but other than to increase life of the auger it serves no purpose as related to better preparation of the shot holes.

Location, direction, and depth of the holes is probably the most important single item of the whole face preparation problem. Individual drilling patterns are used for the arc-sheared cut and the shortwall cut. Coal undercut with the track machine is sheared at a point to the right of track center. Rooms are cut 25 ft. wide and have six shot holes, four tops and two bottoms. The drill post is set up slightly to the left of the shear cut and at a distance of approximately 6 ft. from the coal face. All six shot holes are drilled from this one set-up.

A permissible explosive weighing 10 oz. to the stick with dimensions of 1½ x 6 in. is used. The 25-ft. rooms, cut with an arc-shear machine, are limited to six sticks per room. When 8 ft. of coal is mined and six sticks of permissible used, the two bottom or snubber shots are given ¾ stick each. The two tops next to the shear are shot with ½ stick each and the left top which is slightly heavier than the right, due to the off-center shear, is allowed two sticks while the right top gets 1½ sticks. This amounts to 3¾ lbs. of powder in a place yielding approximately 54 tons of coal or 14 tons to the pound of explosive.

Sixty-five percent of the coal mined is cut and sheared.

All entry development work except the room stubs which may be undercut by shortwall machines depending upon their proximity to a shortwall room section is included in that figure. The company is gradually replacing shortwall machines with the track-type cutting and shearing units. They not only permit the shooting of better quality coal but do it at a reduced cost and, due to their better mobility, reduce traffic congestion. The remainder of the paper was devoted to reduction of slack and fine sizes. The author stressed the importance of standardized face preparation practices to produce the maximum benefits in this work.

Loading and Conveying

Duckbill Mechanical Loading

By PAUL R. WICKLIFFE
President
W. A. Wickliffe Coal Company

THE Browder shaft mine of the W. A. Wickliffe Coal Company is in the western part of Kentucky. The No. 9 seam here is a fairly blocky coal yielding 16 percent of plus six-inch size under hand-loading practice. Sheathed permissible powder is used and premium sized coals have not been sacrificed by duckbill loading. Roof conditions vary considerably. Some sections are excellent while others have a very tender roof. Under-hand loading conditions, rooms worked out slowly, allowing the weight to settle so that extensive cross barring was required. With duckbills a room is rapidly worked out from 12 to 13 working shifts before the weight has time to settle. Cross barring is, therefore, almost unknown.

A definite timbering system which is adhered to under all average conditions. Posts are set on fourfoot centers with two rows of posts carried up each side of the center line of the room. From the swivel to the face, Simplex roof jacks are used which are quick to put up and take down, and enables shifting of the jacks as the loading operation proceeds across the face. As the face advances, the jacks are replaced by wood posts. The bottom in this mine consists of fairly firm fire clay.

The Goodman type G30B77 drive is used. It is geared for 77 strokes per minute and has what is known as a "B" motion. The No. 3 trough, which has a cross section area of 105 square inches is also employed. The first units were installed in 1938 and were equipped with type B "automatic duckbill," having 10 ft. troughs with the silent roller supports. A few light guide frames were used in the high points of the trough line to prevent buckling or jumping.

A successful telescopic trough directly behind the swivel permits an advance of 14 feet, without insertion of another trough. Subsequently 13 foot troughs were used. Since the rooms are driven 340 ft. deep, it required 30 10 ft. troughs to work out a room, while only 22 13 ft. troughs were required when used in conjunction with the telescopic trough. Eight troughs and eight trough supports were thereby saved by going to the 13 foot length.

The first type B shovels were 33 inches wide and with side angles placed at 30 degrees. It was found that the angle the shovel made with the bottom was too steep for efficiency. The design of the shovel was, therefore, changed to 48 inches at the widest part and four feet long, and the shape of the sides of the shovel was changed to eliminate any restrictions to the flow of the coal at the throat of the shovel. An increase from 96 tons per shift to 116 tons was made after these improvements were made.

A work routine for the four men at the face obtains a maximum overlapping of face operations. Loading is started on the right hand side of a room 30 ft. wide and 5 ft. high. When 10 or 12 ft. is loaded the cutting machine is started by one man and at the same time another starts drilling in front and behind the cutting machine. As soon as loading is finished another man starts to clean the cuttings from the kerf. The last man tamped the shots.

The time of starting these several jobs was worked out so that cutting, drilling, dusting the kerf and tamping are all finished at once. The next job was to drag the duckbill up with the cutting machine rope to the correct distance from the face so there would be a minimum of hand shoveling at the edge of the fly coal and still reach the back of the cut. This worked out so well that it was decided more tonnage could be gained by deepening the undercut. The peak shift has been 225 tons with an average of 180 tons per shift. The short duckbills average 130 tons per shift.

With the four entry system the practice is to set the drive in the cross cut in front of the room neck. This permits a part of the width of the haulage entry and does away with hand loading to get space for installing the duckbill. The four entry system as formerly used for mule haulage in hand loading, works out admirably where several shaker units are used on the same set of room entries loading directly into mine cars.

Three men are used at the face and one trims cars in entry work. Moving to the adjacent entry is accomplished with the same number of man-hours that is taken in room work. Where the move is straight ahead 350 feet, it requires one more hour of moving time or a total of 24 man hours.

Track layout for entry driving is the same as for rooms except that at the entry loading point the middle entry track is curved through a cross cut and pointed outby in the outside of entry far enough to hold a trip of cars. Room entry rail is 30 lb. laid on steel ties.

Gathering Belts and Multiple Conveyor Units

By E. H. JENKS
Chief Engineer
Rochester & Pittsburgh Coal Co.

DISCUSSION ABOUT USE of belt conveyors may not be patriotic at this time since the total rubber supply is so vital for fighting machines. To replace large belt installations with track and trolley wire may be as injurious to war production plans as to supply enough rubber to keep them in operation.

Details of a multiple conveyor plan are obviously governed by mine conditions. Mother belts greatly simplify haulage, permit continuous car service and to a large extent eliminate the removal of rock for head room.

At this property the rooms are worked on the full retreat system and room pillars are recovered. The flat heading is driven with the aid of nine conveyors and the mother conveyors have sufficient capacity to remove coal from six working places. Four other conveyors are of less capacity, as they bring coal from one working place. When a heading is advanced to the limit of the conveyors, all of the advancing conveyors except one are moved forward. The cross conveyor receiving the coal from the advancing conveyors is shortened so that it may load the cars on the haulroad. The long mother conveyor is then advanced to the air-way and the conveyor which had been loading the coal into the mine cars is moved up to act as a cross conveyor. This receives the coal from all the advancing conveyors, extending from the extreme left to the extreme right heading. In this mine the flat headings can be advanced more rapidly than necessary to maintain production, therefore the same conveyors used in the flat headings are used to develop the butt headings.

Butt headings are opened up approximately 600 ft. with the flat heading units and the belt conveyor is installed with five secondary conveyors, that are advanced to the limit. Ventilation is established at the inby end of the heading, at which time the heading is ready for the production units. Three headings are driven in order to facilitate the moving of equipment and the rooms are necked through the chain pillar as the heading advances. Eight secondary conveyors are used in the working rooms on each production belt.

The complete installation requires three belt conveyors, four lighter conveyors to drive cross-cuts and chutes and 16 face conveyors if chains are used or 16 right-angle swivels if reciprocating conveyors are used.

Production averages around 2,500 tons per day with this plan in three shifts under favorable mine conditions.

The success or failure of a multiple conveyor set-up where coal is loaded by hand depends very largely on the organization and supervision of the crews. If payment is made on a tonnage rate it means group payment, therefore, the crews should be made up as nearly as possible of men with the same ability. If any conveyor crew is not up to par there will be discontent and instead of the weak crew being brought up to the higher standard, the good crews are very likely to slip back to the lower standard. Multiple shifts increases the difficulty, as it just is not human nature for men to do work for which they are not directly compensated with the hope that the shift ahead of them will do work for them in return. This is particularly true of three-shift operation as one crew does not follow the same crew which they follow. All of this leads to a clean-up system and it works out best to arrange the width of place and size of crew so that the loading of a certain number of cuts with all other work necessary makes an average day's work.

Under such circumstances it is up to the supervisor to see that all incidental dead-work is done as the shift progresses and here a crew can, and will put it over on the on-coming crew unless close supervision is maintained. If payment is made on an hourly basis the discontent in the crews is eliminated but the incentive of piece work is also eliminated and a great burden is placed on the supervisor.

Conveyor belts were installed at this property three years ago, and to date no replacements due to worn belting have been made. Some wear on the edges has occurred but in no instance has either the top or bottom cover worn through. Most of the belts operate three shifts per day, five days per week. There are many parts in a belt conveyor 2,500 ft. long and care is required in moving them to reduce the loss of small parts, such as bolts or short rollers.

Maintenance and Conservation of Equipment

By EDGAR SCHWEITZER
Lehigh Valley Coal Company

TODAY PROPER MAINTENANCE is a vital contribution to the war effort as it gains in importance and significance. Maintenance as practiced by the Anthracite Industry, particularly by the major companies, in the late years has made a demand on the technical and operating personnel that is not so obvious today. Interruptions to production due to breakdowns were simply not tolerated. Since the advent of the short work week more time is now permitted to properly maintain equipment and repair breakdowns.

Other related angles to the conservation and readjustment program in the Anthracite Industry should include radical curtailment in purchases of new equipment by reconditioning of present and old; substitution of materials now out of the market and of improper size; salvaging of materials now in abandoned sections of the mines or in unused plants, and from scrap piles.

Curtailment of purchases is an important policy to follow. Meanwhile the practice of reconditioning machinery and equipment gains momentum. Welding by electric and acetylene methods has been widely adopted as one of the most successful and admittedly economical plans for saving. In a specific case some interesting data was revealed in mine car maintenance by welding flat mine car wheels. It was found a new wheel gave a life of 117 working days; the same wheel welded once, 108 days; welded twice, 80 days; and welded a third time, only 59 days. From the experience gained it is now the practice to run two new wheels with two welded wheels on the same car and obtain practically the life of new wheels. Balancing a cost of welded wheels at $180 per pair against a new wheel cost of approximately $6.75 per pair after scrap allowance, the saving is obvious.

Rebuilding grooved locomotive tires for both steam and electric locomotives by welding is resorted to with some success. Many other uses for the welder around the collieries consist of building up grooved rollers, sprocket wheels, teeth on roll segments, gears and pinions; building up of rail frogs without removal from the roads; making one locomotive boiler tube from two defective ones; repairing broken engine frames and cast iron pipe and fitting breaks; making up pipe lines without the use of fittings; building up worn out pedestals, and many other similar repairs. The use of steel wire instead of the usual welding rod has been found practicable on small acetylene repair jobs. Many other expedients are employed with success to prolong the life of equipment and eliminate the need for new purchases.

Since the entry of our country into the war, the Anthracite Industry is using more and more a metallizing process to salvage and reclaim worn machinery parts as an aid to Industrial Conservation. Metallizing was introduced to the industry during the past year and is proving valuable in the reduction of waste and purchase of new materials almost impossible to obtain due to priority restrictions.

Thus far metal spraying has been used to successfully salvage pump impellers, impeller and casing rings, frame heads for electric locomotives, pump shaft sleeves, armature shafts and locomotive axles. Roughly, the cost of this work generally amounts to from 25 percent to 50 percent that of a new part.

A detailed description of this process as applied to reclamation of locomotive axles by one of the largest anthracite producers may be of interest. The axle is 4 in. in diameter and the worn journal to be built up is approximately 8 in. long. The shaft is placed in a lathe and an undercut of .015 in. is taken on the full 8 in. The area to be sprayed is then rough threaded with a V tool and a special knurling tool then run across the threads to remove burrs and undercut the root of the threads to receive the spray metal. Blasting with metal grit is perhaps desirable but found not to be necessary.

The metal wire used is 0.25 carbon steel and the metal coating is deposited on the axle with one transverse of the spray gun across the surface to prevent oxidation developing between layers sprayed over each other. The gun is put on the lathe feed and the process continued until the metal is deposited to a thickness of .005 in. to .008 in. over the finished diameter to allow sufficient metal for turning or grinding to a smooth surface.

The preparation time required 30 minutes, spraying time 40 to 50 minutes, and grinding or turning time 40 minutes. The total cost is approximately $2.50. A new axle costs $18. Some 300 of these axles have been thus treated in a year and operating reports claim the sprayed metal gives better life than the original metal.

The metal spray is particularly applicable to building up worn parts that cannot be welded on account of distortion or affecting heat treatment.

Reclaiming essential materials from abandoned mine sections and plants will aid considerably in replenishing stock for maintenance and new construction work.

In view of the importance of maintenance in the mining industry, Mr. Schweitzer's paper will appear in full in an early issue of Mining Congress Journal.

Track-Mounted Loading Machines in Open-End Mining System

By AUGUST J. BREITENSTEIN
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THE OPEN-END mining system has been the standard mining plan at all the Frick Coke Company mines in the Connellsville Coke Region for almost a score of years. This mining system, in its present state of refinement, represents the cumulative accomplishments of a great number of years of painstaking experimentation and development. Many of the prime requisites for a good mining system have been developed and are now universally recognized as being attainable under this

system of mining; namely, high mining recovery, satisfactory and positive roof action, safety, a high rate of production per unit of territory developed, and minimum maintenance costs during periods of idleness or intermittent operation.

The problem of applying mechanical loading to the open-end mining system was approached with the primary objective that none of the aforementioned accomplishments would be sacrificed. Accordingly, the problem of mechanization in this system became largely one of adapting cutting, drilling, loading and transportation equipment to the system rather than adapting the system to the equipment.

Track-mounted loading machines with mine cars have been in use in Frick mines for about two years. The procedure of adapting this equipment to the open-end system will be described and some of the problems encountered in this development and the results attainable will appear complete in the 1942 Coal Mine Modernization Yearbook. Therefore, in this brief abstract are listed the author's requisites for successful use of track-mounted loading machines in the open-end mining system. They are:

1. Provide a carefully worked out mining plan projection, in which flexibility for loading machine and face preparation movement is inherent.

2. Concentrate mechanical loading in new sections wherever possible. Working in old cut-up sections imposes a serious handicap on machine operation.

3. Provide adequate and positive ventilation, drainage, power distribution, fire protection, rock dusting, transportation and face preparation facilities so that safe working conditions will be provided and production delays will be kept to a minimum.

4. Eliminate the necessity for handling draw slate in machine sections.

5. Adopt an operating program of two-shift loading and three-shift cutting and face preparation except in periods of peak demand.

6. Concentrate the attention of the mine management upon improvement in face preparation procedures to permit the loader to rotate on less than a six-rib section if possible, thus accomplishing further concentration of necessary open territory for a given rate of production.

7. Train and encourage the assistant mine foremen to keep abreast of all details of face preparation during the entire shift, for this is where the greatest opportunities exist for greater efficiency in the overall mining operation.

8. Adopt a complete and adequate program of preventive or anticipated maintenance to eliminate delays due to machine breakdowns.

9. Train men individually and carefully for standardized and definite jobs covering all the different elements in the mechanical mining operation.

10. Develop and install a standard production and cost procedure to control the mechanical mining operation and to obtain comparative performance data on various machine applications.

Shuttle Car Operation With Tractor Loaders at Peabody Coal Co.

By A. F. PHILLIPS
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Peabody Coal Co.

THE SPRINGFIELD DISTRICT mines are operated in the No. 5 vein in central Illinois. The vein of coal lies from 230 to 250 ft. below the surface; and it is from 5 to 6 ft. thick. Immediately overlying the coal seam is a strata of black slate, from 2½ ft. to 4 ft. thick. This slate carries so-called nigger-heads, which extend from a few inches to 10 or 12 inches down into the coal. Above the slate there is a strata of lime rock, varying from a few inches to 3 ft. in thickness. Underlying the coal seam is a strata of soft fire clay.

The slate, due to its thickness, sounds solid, but it lets loose without warning. Nigger-heads also appear in the slate at irregular intervals, and extend down into the coal. Sometimes they are so numerous and of such proportions, that the weight causes the slate to pull loose. The cutting of the coal becomes very difficult, when these hard and flint-like horsebacks are encountered. This condition requires a standard system of timbering. Two rows of props are carried, with 3 ft. of clearance from rails, on each side of the room, within 15 ft. of the face.

Cutting is done with a tractor-mounted shearing machine, having a 9-ft. cutter bar. The shear is made in the center of the working face, and it extends the entire thickness of the seam from top to bottom.

The method of working the rooms is called the advance face or step system. The advanced face is 12 ft. wide and from 7 to 9 ft. deep, with the shear cut placed in the center of the advanced face.

Holes are drilled in each room with post-mounted electric drills, using a 2¼-in. conveyor-type auger. Drilling equipment is carried on a rubber-tired car made from a "V" Eight, Ford chassis, powered by a 3-hp. motor. These cars are built at the mine.

Black powder in pellet form is used for the blasting, which is done after all men are out of the mine. Coal is loaded with tractor-mounted loading machines, and transported to a point where it is unloaded from the shuttle car onto the elevating conveyor. From the elevating conveyor, it is loaded direct into the mine cars, that are hauled by a 6- or 8-ton trolley locomotive. Generally, 10-car trips are handled. Each shuttle-car section has three shuttle-car units served by one main-line parting. The main-line haulage motors haul trips of 30 cars, and are timed so that lost motion either on the part of the haulage motors, or the relay motors, serving the shuttle cars, is always at a minimum.

In changing batteries after quitting time, a specially constructed insulated truck, each holding two trays of batteries, is used for transporting the batteries from the changing station to the charging station, where they are charged and serviced by an attendant.

The specially constructed trucks for transporting the batteries are built to accommodate three trays of batteries. In making the battery change, the shuttle car is placed across the track, and at right angles to the track with a battery truck containing two batteries placed on each side of the shuttle car. The batteries are placed on the truck so as to leave a space between them for placing the run-down battery. A battery is picked up from one side of the shuttle car and placed in the space left for

it, and the fresh battery is lifted from the truck and placed in position on the shuttle car.

Shuttle cars used are of the 42D type, with a capacity of five tons. They are equipped with 10:00 x 20 tires on the rear wheels, and 7:50 x 20 tires on the front. Due to the shortage of tires at this time, the author suggests every precaution be taken to get the longest life possible from all rubber tired equipment. Coal or rock projecting along the haulage roads submit tires to rough wear and should be removed.

Due to the shortage of material and slow deliveries on supplies and repair parts for shuttle cars, tractor loaders, and other equipment, frequent inspections should be made of the machines to keep them in order and prevent break downs.

Advantages of mechanical loading over hand loading pointed out by the author are: Operations can be confined to a much smaller area and closer supervision can be maintained over the work performed by the smaller number of men used in a shuttle car section with tractor loaders.

Coal Preparation

War Time Coal Preparation—Maintenance of Quality Standards

By W. D. STEELE
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Consolidation Coal Company

COAL preparation under either war or peace time is a problem that concerns both the producer and the consumer. The highly competitive conditions in the industry made the producer vulnerable to the requests of the consumers for a fuel to fit their equipment, therefore, elaborate mining programs and installation of cleaning and blending facilities.

In war-time preparation, consideration must be given to the tonnage of coal required for metallurgical and coking coals; by-products and gas coals for use in synthetic processes; industrial steam coals, and domestic and export coals.

To produce and recover an additional tonnage of quality coals will require study of all coal markets so as to salvage all tonnage possible. The metallurgical market must be protected ahead of the markets less essential to the war production program.

In the by-product and gas industries, we may reasonably expect some latitude in quality application if a study of the particular use is made. Many of the consuming industries have recently shown that they have the ability to use coals of quality ranges which they hitherto thought impossible. Intelligent cooperation of the two industries has brought this about, and as a result, tons of suitable grade coals have been re-discovered, so to speak.

Preparation under present-day standards and those for the immediate future may produce facts of immeasurable value and will serve as a guide to which markets coals are most suitable.

Industrial steam coal constitutes the largest consuming industry among all users of coal. This market has been using coals with a range in ash content of from 3 percent to 25 percent and with a corresponding range in percentage of other factors of quality. The controlling factor in the movement of these coals has been competitive delivered costs balanced against performances. Each producer should maintain qualities of his products in line with past performance as far as his available reserve will permit after satisfying the other war industries markets previously discussed.

Many new outlets have been made available in this market due to war-time restrictions placed upon other fuels that previously had been competitive. A producer operating under war-time preparation standards should pursue a course so he will not jeopardize his position in the post-war market under natural competition.

The preparation of the coals for domestic market will be subject to changes that might become disturbing to the consumer. There will be, due to the requirement of large tonnages under seasonal demands, limitations of sizes brought about by balancing of size grades for other industries and certain quality and size restrictions as a result of local ordinances on smoke abatement. The sacrifice of coal from this market to the other essential markets, plus the increased tonnage demand created by those who have converted from other fuels to the use of coal for heating purposes, will place a heavy burden on the industry in attempting to meet the conditions.

A review of the trend for export coal over the past years indicates the Canadian market has been relatively stable with the demands closely paralleling the steam and domestic demands within this country. The South American demand has been relatively light though it gives promise of development to the extent that it will be an important one in the future. We will desire and need this market at a future time and should protect it to the limit of our abilities.

In general, war-time preparation of coal for all mar-

kets must be considered as that involving a knowledge of what a producer has, how it can be produced and where to apply it to obtain the greatest use value.

As an aid to the proper mining method to be used in extracting the coal, it is suggested that a sectional analysis be made of each of the horizontal sections of the seam. From the information, control of the quality of the separate size grades can be predicted and outlets arranged accordingly. Strict standards of preparation control at the working face should be in force and designed to cover the proper handling of impurities, the cutting, drilling and shooting practices.

Coal Drying and Other Auxiliaries of Preparation

By JAMES HYSLOP
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THE COAL PRODUCED at the Piney Fork mine has a fairly high ash content in the finer sizes, due to the presence of seam impurities and draw slate. The market into which the coal moves requires that the moisture content be kept to a minimum. The inherent moisture in the coal averages 2 percent, and the market requires that the total moisture in the 0 x 3/8 in. fraction be held to 5 percent.

Experiments with air-cleaning equipment have shown definitely that it is not possible to produce the required results by that method, due primarily to the concentration of impurities in the minus 3/16 in. coal and also because much of the coal comes from the mine in a wet condition, which makes dry screening of the fine sizes impractical. A careful study of the problem resulted in the selection of equipment which washes all of the 0 x 7 in. coal; centrifugally dries the 0 x 1 1/2 m.m. size and dries the 1 1/2 m.m. x 1 1/4 in. coal thermally.

Washing is done in two Link-Belt wash boxes. Box No. 1 handles the 0 x 1 1/4 in. fraction and box No. 2, the 1 1/4 x 7 in. size. The reason for sizing the coal prior to washing, is to improve the cleaning job on the fine coal by providing a relatively narrow size range in the wash box. It was first contemplated, originally, to wash only up to the 6-in. size, but results were so satisfactory that washing up to 7-in. size was tried and the performance warranted the adoption of this practice as a regular procedure.

In selecting the drying equipment a careful study of results obtained in various types of equipment throughout the country was made including the company's experience with the same coal at another mine, and finally adopted the system described which is, so far as the author knows, unique, differing considerably from any other plant investigated. The problem involved the reduction of the surface moisture in the 0 x 3/8 in. coal to 3 percent and maintaining the moisture content in all minus 1 1/4-in. sizes as low as possible. At the Willow Grove plant the 28 mesh x 1/2 in. coal is dried in a rotary type dryer. It was found not possible to produce 3 percent surface moisture coal in this machine without serious overheating. The problem in this type of dryer would be greatly increased if the 0 x 28 mesh product were included. At Willow Grove this size is wasted, representing a considerable loss and it was determined that this size should be recovered at Piney Fork. It was with this idea in mind, that a fine coal flow sheet was designed, that uses a settling tank, of the drag-conveyor type. This permits the accumulation of the 0 x 1 1/2 m.m. coal without separating the finer fractions and at the same time permits the circulating pumps to handle clarified water.

The problem of thermal drying is complicated by the fact that where a wide range of sizes is dried in the same machine, the coarser particles dry more quickly than the finer ones, and if an effort is made to produce a low moisture coal, the larger sizes become overheated.

A 48-in. C. M. I. Centrifuge is used to dry the minus 1 1/2-m.m. product. Coal enters this machine at 25 percent moisture and is dried to 6 percent surface moisture. The centrifuge is equipped with a screen 1/16-in. thick, having 1/16-in. perforations. The life of this screen, at this plant averages 80 hours, as the coal is very abrasive.

The screen type dryers were especially designed and built for this plant by the Link-Belt Company. Performance of these machines in this installation has been very satisfactory.

At Piney Fork the screen decks are 6 ft. wide and 16 ft. long, providing a drying surface of 96 sq. ft. One interesting feature of construction is that all of the wind-box under the screen is of reinforced concrete construction. It was found that many dryer installations, handling high sulphur coal, experience serious trouble from corrosion and the use of concrete on this installation eliminated trouble by keeping the exhaust gases out of contact with metal, except in the fan and fan stack. The fan wheel, is of a stainless steel construction. All water, condensate and fine coal passing through the dryer screens is sluiced into a sump from which it is taken by an effluent pump, which in turn deposits it into the sludge tank, from where it is recirculated.

The coarse coal dryer is equipped with stainless steel plates, having 5/16-in. round perforations. The fine coal dryer was originally equipped with Bixby-Zimmer screen cloth, having 1-1 1/4-m.m. openings, and 1.16-in. stainless steel wires. Blanking difficulties were experienced on this deck and the problem was solved by equipping this dryer with Bixby-Zimmer cloth with 1/2-m.m. spacing of 1/16-in. stainless steel wires running lengthwise of the screen. We experienced no trouble whatever with blanking with this equipment and we are able to dry the 1 1/2 m.m. x 3/8 in. coal to 1 percent surface moisture. More experiments are under way with this cloth in conducting screening tests.

The possibility of further reducing the moisture in the minus 1 1/2-m.m. size is contemplated and in the event that it becomes necessary, it is believed that flash drying affords a possibility.

Safety

Distributing and Handling Explosives Underground

By B. L. LUBELSKY
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A CERTAIN AMOUNT of time in the preparation of this paper was devoted to a search for new or original material that might be offered. However, the author was unable to find anything which might be properly classed as new or original that would add materially to the information which is and has been available on this subject.

The regulations which have been set up, have as a primary aim the prevention of major disasters. The other objective of these regulations is, of course, to reduce and to finally eliminate those recurrent face accidents which are responsible for 30 to 60 fatalities annually. These accidents are minor to the extent that the exposure is usually one or two men rather than a large group of men, and the property exposure is slight.

A great deal of the neglect in handling of explosives appears to be due to the erratic nature of the material itself. Explosives as now used are reasonably stable, rather insensitive to ordinary causes of detonation and can in the main be handled roughly, abused and good practices disregarded without resulting in an accident for every abuse. Unfortunately, however, explosives even today are a mechanical mixture in which no single cartridge is exactly like any other cartridge, and no single section of any one cartridge is exactly similar to any other section. It, therefore, follows that these abuses which may not result in any explosion in 99 cases, may in the one hundredth case cause serious damage, and which of the 100 cartridges will be the sensitive one is disclosed only after a man has been seriously injured or killed. Electric blasting caps are as erratic in their way as explosives.

Unfortunately for the effort to reduce explosives accidents, they do not occur frequently enough in any one mine to be considered recurrent and, therefore, fail to get the proper attention which might be given were they of the recurrent type. But in the industry as a whole they are recurrent and are of sufficient importance to justify considerable effort expended in their elimination. Of the several recommended types of main magazines, it is my opinion that the lean-cement mortar construction of the Bureau of Mines type magazine, is the most desirable. Three of these were built by the Philadelphia & Reading Coal & Iron Company between 1932 and 1936. One was reported on in a paper by S. P. Howell and B. L. Lubelsky in 1936 as follows:

"Experience with the Bureau of Mines type of lean-cement-mortar magazine near Bruceton, Pa., had shown that it was relatively cool in summer, so one was constructed by the Philadelphia & Reading Coal & Iron Company at one of its collieries. It is of 25,000-lb. capacity, has been in service three years, and is in excellent condition."

Explosives and detonators should at all times be kept apart until they finally meet in the priming cartridge just before it is placed in the drill hole. The reason is simple. Explosives may be discharged in various ways, but in the main a premature discharge except in combination with a detonator is rare. Explosives can, however, be set on fire, and if undisturbed may burn quietly without violence. Detonators on the other hand may explode under many different types of applied shock, and will certainly do so if burned.

Where underground magazines are used to store explosives for distribution, the importance of the condition of that magazine is even greater than that of the outside magazine. It should be well built into the rib, preferably lined, so as to prevent moisture from entering, should have a good fire-proof door, and should be kept locked.

Handling of misfires is a special operation that requires discussion although not part of the regular cycle of operations. There is probably no safe way to handle a misfire where conventional stemming has been used. The use of the "expansion type" blasting plug does offer completely safe handling of misfires. That accidents from misfires are increasing rather than decreasing is surprising for with the increasing use of electric blasting the ratio of misfires that should normally occur per unit number of shots should be materially decreased as compared to cap and fuse firing.

Face accidents which are the common recurring ones in the handling and use of explosives divide readily into two major groups. The first group can be described as consisting of those accidents which can be eliminated by changing to less hazardous materials, i. e., using permissible explosives and electric detonators to replace black powder, cap and fuse, fuse and squibs. With no greater caution on the part of the men handling the explosives and with no greater application of supervision, the accident rate can be reduced materially and some typical accidents eliminated entirely.

What conclusion can be drawn from this set of facts must, of course, depend upon the point of view of the individual. It is the author's conclusion that new regula-

tions, or more regulations, are not required but what is needed is more careful supervision of the elementary rules required to make the handling of explosives as safe as can be. And by careful supervision is meant that a specific thing must be done by all face bosses, assistant bosses, fire bosses, foremen and superintendents who are in contact with the man who does the blasting. First, they must realize and become fully aware of the fact that if a man follows a bad practice in their presence, he does so because that practice is habitual with him, and more important, if they see that bad practice and do nothing to stop it immediately, they have then condoned that practice and the chances are negligible, that the man will ever change it in the future.

Sealing Worked-Out Areas

By WALTER E. BUSS
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WHILE THE NECESSITY of sealing off portions of coal mines suddenly rendered dangerous from fire or other causes had long been practiced, the systematic sealing of worked-out areas as a safety provision and aid to ventilation was initiated, we believe, at Mine No. 1 of the Knox Consolidated Coal Corporation, Bicknell, Ind. At any rate this mine was one of the very first to adopt this practice, beginning in the year 1915.

Since that time two hundred seals have been constructed at this mine. The practice once started (not without some qualms) has become a regular and routine procedure about on a par with the building of an overcast or any other ventilation requirement.

Possible hazards of sealing were many at this property. They included through accident or carelessness, the breaking into of adjoining workings with its load of entrapped gases; the weight of the overburden, crushing an intervening coal pillar or the seal itself and release the threat confined within; the possibility of an external explosion could blow out one of these seals thereby heaping further havoc on a situation already bad.

But, worst of all, was the ever-present possibility of gob fires igniting spontaneously somewhere within the inaccessible depths of these panels, a possibility which had materialized into reality often enough to demonstrate that this was no empty fear. Gob fires, be it noted, in the near presence of methane! The choice, then, seemingly became one of two evils. Sealing with its known but controllable hazards, versus the unpredictable and uncontrollable hazards of the open depleted areas. There could be but one logical choice.

The next consideration was to seal adequately and safely. The seals must be strong enough, structurally, to withstand any reasonably possible contingency and practically leak-tight.

About the first question which comes to mind is, "How thick should a seal be to be safe?" The correct answer to this question will have to take into consideration the conditions under which the seal is being built. If the sealed area is likely to fill with water, seals must be proportioned to withstand the hydraulic pressures involved or provision made to drain the area.

Where hydraulic pressures are not a factor the controlling consideration determining the thickness of a seal is the external pressure which may possibly develop from the force of an explosion.

Pressures recorded by the Bureau of Mines in a series of experimental explosions studied at the Bruceton Mine, averaged in four violent explosions and from four recording stations, over 33 lbs. per square inch. One recording indicated a pressure of 72 lbs. which was the maximum. Such an extreme would exert a force of 466 tons against the outer face of a 6 x 15-ft. seal.

On the other hand none of the tests involving a mixture of coal dust with shale dust, half and half, developed pressures greater than 16 lbs. per square inch and where 60 percent shale dust was present 3 lbs. was the prevailing pressure.

In order to determine the strength of stoppings constructed under practical coal-mine conditions the Bureau of Mines made a number of tests, the results of which were published in Report of Investigations No. 3036, suggesting specifications for constructing an unreinforced concrete stopping to withstand a pressure of 50 lbs. per square inch.

Samples of the air behind the seals should be taken at intervals and analyzed to check on the effectiveness of the sealing. These samples should be taken through a valve provided for the purpose on days when the seal is "blowing." Normal or abnormal behavior can thus be detected. In our seam of coal it takes about three months to reach a more or less static condition in which the oxygen has practically disappeared except for a fraction of 1 percent, carbon dioxide about 4 percent, methane about 31 percent. Other seams may show different percentages but each will develop a normal atmosphere which will be indicative of good sealing with no leaks.

If sealing is proposed it is, of course, a foregone conclusion that the mine is laid out for that purpose. The sections must be isolated from each other by sufficient pillar and the entries where sealing is contemplated should be driven narrow a distance "outby" and "inby" the proposed location.

Most of our seals are made of brick, the inner and outer face a single brick thick laid with trowel and mortar while the inside bricks are merely laid in a bed of mortar, proportioned two parts cement to three sand. The seal is built from the hitching toward the center and an opening about 2 ft. square at the top is left for the final closure, the inner face being plastered before this closure is made and a companion seal closed at the same time in the adjoining entry. This to permit some ventilation through the area to be sealed during the period of construction. The remaining hole is closed two bricks thick at first and then the remaining thickness. Finally the outside face is plastered. A 2-in. pipe extends through the seal about 2 ft. from the roof for sampling and a 4-in. pipe is placed at the bottom for future drainage, if

necessary. Both are fitted with gate valves and may be locked to prevent opening by unauthorized persons. The roof should be well timbered on both sides of seal. Sometimes wing walls may be advisable, these to retain the coal rib both sides of the hitchings and to serve as support for steel beams to protect the roof for a distance both inside and outside the seal.

While it could scarcely be expected that a seal could be built 100 percent leak-tight, since the materials of which they are constructed have a certain degree of porosity, the leaks which do develop are of small consequence and very easily diluted by means of the air deflector mentioned. The author believes that painting the seal with an emulsified asphalt paint might have merit in reducing leakage due to porosity.

Coal Dust Allaying in Cutting, Loading and Transportation

By J. C. JOHNSTON
General Inspector
Koppers Coal Division, Eastern Gas & Fuel Associates

WETTING COAL INSIDE the mine, to prevent or minimize the amount of fine dust thrown into suspension during handling, is not a new procedure. With the advent of mechanical loading and conveying, it is receiving more attention now. The necessity for control of dust underground is today coupled with screening difficulties not present formerly, together with market requirements which are more exacting.

It is considered possible to prevent dust from contaminating mine air by the use of water alone, but the quantities of water so added may wet the finer coal to the point where screens with small openings will fail to function. If screening is not a problem, then the amount of moisture in the coal shipped may become one. Today's problem is to reduce the dust hazard in the mine, and at the same time preserve the size and analytical quality of the product shipped to the consumer.

The major difficulty in keeping any dust proofing or allaying liquid to a minimum, whether it be oil, calcium chloride, or water, is the avoidance of waste, caused by application on machinery, or blowing away, or application on the coarser grades of coal which do not require it. Each installation has a different mechanical arrangement into which spray equipment must be fitted. The elimination of waste is, however, one of the important factors influencing the location of sprays inside. At the elevators loading into mine cars, and at the transfer points from room to mother conveyors, as much material may be applied when no coal is running as is applied to the coal. Control of the water by automatic means is not feasible because of the difficulty of getting equipment at once delicate enough to respond to differences in coal flow, and rugged enough to withstand the service to which it is subjected.

For the reasons outlined above, and for the still more important one, that at the working face the dust contributes the additional hazard of poor visibility, it has been found most advantageous to allay the dust at that point.

This company found that if the bar and bits are wet on the ingoing side, the dust is made in a damp condition and no suspension in the air results. To date, it has been found that no additional spray is necessary. This applies to shortwall machines. Conditions may be somewhat different on arcwalls. It does not seem to make much difference how the water is applied to the bar, i. e., whether in a stream or a spray, as far as effectiveness of action is concerned. It may make a lot of difference in operation, however. If the seam is low, and water pressure high, a splashing will result which affects the machine helper as he handles the tail rope and cuttings. Where the pressure is over 20 lbs., a spray is used, and as most of the wetting agents on the market are supposed to work better at high pressures, this would be practically all of the time.

There are two methods of transporting water to the point of spraying. One is to use a tank, either attached to a mobile loader or track machine, or set off near the spray point. The other is to use pipe lines. The former can be done with less material expense, but handling the tank may interfere with haulage operation or handling other supplies. Pipe lines may cost more, but once laid they are out of the way.

The most satisfactory type of pump for this work is a turbine type, or rotary. The latter is used when the wetting agent has some lubricating qualities, the former is adapted to installations without regard to the lubrication. While ordinary gathering pumps can be made to serve in some cases, they are generally of too low a pressure and too high a capacity to fit this service. Where piston pumps are used, a pressure tank, made from a 50-gallon range boiler, can be used in the same manner as in the ordinary house pumping system.

In conveyor rooms the water is carried to the face by hose. Pipe line is not nearly so flexible, nor so easily moved from place to place. A heavy-duty, six-ply water hose is used at this property. Ordinary water hose will not stand the service, and air hose is very expensive.

The treatment outlined here is not one which will permanently dust proof coal as does oil or calcium chloride. In the ordinary routine of mining, any coal, properly sprayed at the face will retain its dust proofing until it reaches the outside tipple, and the dust suspension at transfer points will be correspondingly less.

One of the greatest difficulties experienced is interruption of spray service. This practice is still too new for all the "bugs" to be worked out on maintenance, and these interruptions make it difficult to judge just how efficiently the system does work. However, it has been found that once pipe lines are in place, hose connections located, and strainers placed ahead of the sprays, these interruptions drop considerably.

Strip Mining

Primary and Tandem Dragline Operation

By LAFE STEWART
Chief Engr.
Maumee Collieries Company

THE PRIME ADVANTAGE of the dragline over the stripping shovel is its extreme flexibility and versatility in performing the many and various dirt-moving jobs encountered in stripping operations. The long reach of the dragline, both horizontally and vertically, gives it a far greater range than the shovel, with a consequent ability to spoil a greater volume of earth. A machine equipped as a dragline will also handle a greater depth of overburden than will the same machine equipped as a shovel.

The obvious disadvantage of the dragline is, that the same unit equipped as a shovel will handle approximately 100 percent more yardage within its limited range and also, it has the ability to handle rock formations which are difficult and sometimes impossible for a dragline.

Tandem operation of a dragline and shovel in stripping, is frequently employed as a means of increasing the depth of overburden that may be negotiated, or of increasing production in an existing shovel operation. The determination of practice in this case depends on the relative yardage capacity of the two machines, their comparative spoiling reach, character of overburden and pit layout.

First and perhaps the most common method employed, is to have the dragline travel the spoil bank, opposite the shovel; and rehandle spoil cast up by the shovel. By this means, the shovel is enabled to strip more than its normal capacity in depth of overburden. This method is only valuable in areas where the overburden is over the capacity of the shovel alone, as all of the dragline yardage is a rehandled yardage.

There are a number of tandem operations using a second method, in which the dragline moves behind the shovel in the pit, pulling from the top of the highwall and spoiling on top of the shovel spoil. In this case, the greater part of the dragline yardage is pay yardage, but the efficiency of the machine is somewhat reduced, due to the extreme loading angle of the bucket and the necessity of cleaning the roll behind the machine. The position of the machine, however, gives it range to handle a job that would require a larger machine if used on the highwall. In this combination also, the two machines must pass in the pit, which requires special cars and coordination at the end of a cut. The dragline in this location does have a definite advantage, however, in pits where haulage is maintained through roads cut in the spoil and advanced with progress of the pit.

A third method of tandem operation might be set up with the dragline traveling the highwall and casting into the pit ahead of the shovel. This method is seldom used, inasmuch as the overburden depth which the combination of units is capable of handling is limited by the spoil range of the shovel, and the top soil and clay are deposited in the base of the spoil bank. This arrangement can only be used to boost yardage in pits where overburden conditions are such that it can be successfully accomplished.

A fourth method of dragline-shovel tandem operation is that employed at Maumee's No. 23 mine. There, the pit section is developed, with the dragline following the shovel on a highwall bench and casting behind the shovel spoil and over the main shovel cut. This operation requires a dragline with an extremely long reach, but, it has the definite advantage of eliminating congestion in the pit. All of the yardage handled is pay yardage, no rehandling whatever being required.

Practical limitations of dragline operation, either primary or tandem, may be easily determined by an analysis of capacity of machines. When considered with other factors of individual pit significance and operational detail, the value of an available unit or the economy of acquiring additional equipment becomes apparent.

The increasingly wide use of larger dragline units in both primary and tandem operations, has been brought about largely by one fact. Many owners of large coal territories have found themselves, after a few years stripping in light overburden, possessors of considerable acreage of coal having a cover just over the depth which their shovels will handle. Frequently the recovery of this coal has been made economically possible by proper development of dragline operation. There are now large areas of coal in this classification which will some day be recovered by the continued application and development of dragline operation.

Power Distribution and Protective Devices

By RUSSELL L. ALPINE
Chief Electrician
The Enos Coal Mining Co.

IN GENERAL, the mechanical design of a substation for a coal mine is not different than that for any other type of load, due consideration being given to the voltage of the transmission lines; voltage required for the mine; number of low-voltage circuits required; and the probable duration of the load. The last mentioned is usually most important in determining the materials to be used for the structure, i. e., steel or wood. A substation which will serve for a short period, three to six years, would be built of wood; while one for a moderately long period, 12 to 15 years, would be of steel. For short periods, steel offers no advantages over wood as far as continuity of service is concerned. Over longer periods, a wood structure would require more maintenance work than a steel structure, which might cause occasional shut-downs for short periods. Beyond question, the present war period will increase the use of treated timbers and improve the design of substation structures recently developed by Hughes Brothers.

Electrically, the substation design is not far different from other substations. On the high-voltage side an air-break switch is provided to isolate the station and all equipment except for the line connection to the switch. Lightning protection is provided by conventional lightning arrestors, connected as close to the transformer bushings as is convenient, and grounded to a low resistance ground connection. Practice differs between power companies but it is the practice of the Public Service Company of Indiana to use a common ground bus for all equipment grounding in the station, including transformer cases, lightning arrestors, the station structure (if it be steel), the fence enclosure, instrument transformer secondaries, etc.

With proper overload protection on the low-voltage circuits the overload protection on the high-voltage side need not be elaborate. Expulsion type fuses are most commonly used for this protection. In remote cases, where the short-circuit current of the transmission line is very high, liquid-filled or boric acid fuses may be required.

When a substation serves only a tipple, machine shop, or other fixed load where the utilization equipment can be thoroughly and permanently grounded, the distribution system may be either solidly grounded or ungrounded. If movable equipment (shovels, draglines, etc.) is served, safety considerations usually require that the distribution system be ungrounded, or grounded, through an impedance.

An ungrounded system offers some advantages over a grounded system in that a ground fault may occur on one phase wire without an interruption of service.

A solid grounded system will clear the circuit on which a ground fault occurs without interruption to other circuits from the station. A ground fault on one phase will cause a fault current to flow out the phase wire and return to the station through the earth. The value of this current will depend on the length of the circuit and the type of contact between the faulted phase and ground.

However, a solidly grounded system has the disadvantage of raising the voltage of any equipment to which it may make accidental contact above true ground voltage unless the equipment is connected to a very low resistance ground.

For these reasons it is necessary to use circuit breakers instead of fuses for the protection of low-voltage circuits in mine substations. Breakers can be tripped with ground relays while fuses cannot.

Lightning protection for the distribution circuits is obtained with conventional distribution or line type arrestors. On solidly grounded systems, the arrestor rating is based on the phase-to-neutral voltage; on ungrounded systems, on the phase-to-phase voltage. For example, a 2,300-volt delta system would require arrestors having a 3,000-volt maximum rating, as would a 2,300/4,000 Y volt solidly grounded system. However, if the 2,300/4,000 Y volt system is ungrounded or impedance grounded the arrestor rating would have to be increased to a value higher than 4,000 volts, the next commercial rating being 6,000 volts maximum.

The system of secondary distribution used is the 3-phase, 3-wire, 440-volt system. At the end of each lateral a bank of three single-phase transformers are installed on a portable sled which is enclosed by a picket fence. Transformers 15 KVA to 37½ KVA of 2,300 and 4,000-volt ratings are used in the system. Power is furnished to pumps, drills and air compressors in the pits. Stripping shovels, loaders, drills, pumps, welders and air compressors are supplied with power through G. E. Tellurium jacket all-rubber portable cables.

Drift Mining From Strip Pits

By J. M. McCOY
Engineer
Truax-Traer Coal Company

ANY STRIP MINE must work in the lower overburdens of the coal seam to be able to remove the overburden economically. Consequently, an operator sometimes faces the question of stripping a heavy section of overburden or to mine this section of coal by underground methods or to abandon the area.

The methods used by the Truax-Traer Coal Company, St. David, Ill., to determine or answer the question "Will

it pay?" were applied to the questions involving the purchasing of equipment and the solving of the proposed underground operating methods. The first limiting factor was to determine the safety of the investment. The second limiting factor concerned the return on the investment and the safety factor. This statement is self evident but to accurately determine the revenue before operation is started is not simple.

Over 24 complete mine layouts were made before deciding upon the present operating system for this company. From the studies of the available coal at the Truax-Traer property, and considering a man-day tonnage production of 30 tons or more, it was decided to work blocks of coal one-half mile wide and one-half mile long. When costs of investment and operation costs were balanced, this size of block of coal gave the economical size for this property. In the plan, equipment could be concentrated in relatively small areas for efficient supervision. Blocks could be worked out and abandoned without interfering with other sections of the available coal.

The coal seam varies from 6 ft. to 7½ ft. thick. Overburden consists of about 18 in. of white shale, blue shale and in some locations of the property, limestone varying from 18 in. to 10 ft. thick. The blue shale varies from 15 ft. to nearly 30 ft. The remainder of the overburden consists of limestone boulders and clay. The total overburden varies from 70 ft. to 110 ft.

The room and pillar method was decided upon and as soon as the new cross entries were completed, new rooms were started. The robbing of pillars by a second loading crew in the previous panel commenced as soon as the first cross-cuts were made in the new rooms. This method is giving over 70 percent recovery.

The next problem faced was the cutting and shooting. Two class 7-B Sullivan shortwall cutting machines were purchased with 9-ft. cutter bars. The reason the shortwall cutter was used was that it could be employed with any type of haulage and its investment was relatively safe.

After some trouble with bits, etc., one of these machines was mounted on a turntable and placed on a rubber-tired truck. This shortwall is being used as an arc cutter and is giving excellent results. The company is now mounting the other shortwall cutter in a similar fashion with a slight improvement in the turntable. With this method, the shortwall cutter is working in clean coal, consequently increasing production and reducing bit and maintenance cost. The company also uses Jeffrey Universal cutting machines type M-29-U, mounted on caterpillar treads for shearing and entry work. This machine can be operated over 42-in. gauge rails if desired.

Since the roof characteristics vary in short distances, cutting and shooting has been a problem. Cardox is used for blasting the roof shots and permissible powder in the blue-band area. This system has produced the best loading conditions, and at the same time protected the roof. However, this practice is not standard as the company is still experimenting to improve blasting technique. For loading purposes three No. 11-BU-7E Joy loaders mounted on caterpillar treads for 42-in. gauge track are used. These machines have rear conveyors for shuttle-car loading, and also can be used for direct-car loading.

The problem of hauling developed into several factors which had to be given consideration and it was determined that shuttle-car loading at the face answered the requirements.

Power cable is used instead of batteries for the cars. This increases load capacity more than 1,000 lbs. By arranging the cross-cuts properly, the shuttle cars are routed so the cables are not driven over. The Company has seven shuttle cars of 6-ton capacity, four-wheel drive and four-wheel steer, from the Lee-Norse Company.

The conveyors used are adaptable to coal mining and are made of strong trusses 9 ft. long built so they can be widened for any width of belt up to 48 in. The sections are light enough for four men to handle. Each drive is designed to handle a belt frome 1,300 ft. long, using a push-button starter, and 220-volt, 3-phase, 60-cycle motors. These frames are the Barber-Greene 12-in. truss standard construction belt conveyors. Stock piling is done by a Barber-Greene coal stacker mounted on caterpillar treads that will pile coal 35 ft. high.

Strip Mine Haulage in Eastern Ohio

By A. H. HENRY
Asst. Supt.
The Jefferson Co.

FEW operators realize how complex the haulage problems become in the Ohio field with reference to numerous grades, power plants in the units of proper size to negotiate these grades, and the vast amount of engineering and surveying employed in road construction to maintain a constant flow of coal from pit to tipple.

In the strip mines of eastern Ohio, the Pittsburgh or No. 8 coal is hauled from the loading shovels to the tipples entirely by trucks. No combination truck and rail systems are in use at the present time. There are three size groups of coal haulers used in this section. The smallest are the 5-10 ton back-dump trucks; second, the 10-20 ton back-dump and bottom-dump semi-trailers; third, 25 ton bottom-dump semi-trailers. The back-dump in the 5-10 ton capacity group is used exclusively by the small operators. By small operators is meant those companies using gas and diesel shovels capable of stripping to a maximum height of 40 ft.

This section of Ohio is very hilly and as acreages of low cover stripping are depleted, the operator is forced to locate elsewhere. For this reason, equipment that is easily moved from place to place is employed. Most of the hauling is done on public roads and berm coal in the pits. Most common back-dump trucks used on this type of operation range from 85 to 100 hp. and are small and fast.

The second size group includes the 10-15 ton back-dump heavy duty trucks now in use at the Hanna Coal Company's Georgetown No. 12 operation. The smaller

units of this fleet consist of six 116 hp. trucks. These are equipped with 12:00 x 24 tires both front and rear. By standardizing on tire sizes, inventories are kept at a minimum as only two sizes are used on both types. Under favorable weather conditions an average speed of 25 m.p.h. is obtained with a full load of 10 tons of raw coal. On a one-way haul of 2½ miles, it is estimated that these trucks will make 5.10 trips or haul 51 tons of raw coal per hour.

The Hanna Coal Company considers this the ideal dump truck for use on private roads where little grade is encountered. In September, 1941, five trucks powered by 230 hp. gasoline engines were purchased. They are equipped with 14:00 x 24-in. rear tires and 12:00 x 24-in. tires on the front. These back-dump trucks haul 15 tons of raw coal and are by far the largest back-dump truck in service in this field. These units are averaging 4.70 loads per hour on a one-way haul of 2.5 miles, which adds up to 70.5 tons of raw coal per hour.

The Haverhill Coal Company has been using 16 ton semi-trailer outfits for the past seven years. Their fleet consists of nine tractor-trailer units. The tractors are powered with 150 hp. gasoline motors and have 11:25 x 24-in. tires all around. Eight of these units are in use, and on an average one-way haul of 2.5 miles they move about 44 tons per unit per hour. These trucks are geared for high speed and will travel 35 to 40 miles per hour empty; a loaded speed of 25 to 30 miles per hour on level going, and 15 miles per hour on a 6 percent grade is obtained. This type of haulage unit can turn on a 45 foot radius and a common practice is to leave about 30 feet bench in the pits with wider passing places left at regular intervals. These passing places are usually made up from dirt and rock cast next to the bench coal by the loading shovel and leveled off with a bulldozer.

The Haverhill Coal Company is more than satisfied with these units and what they like about them most is their ability to retain a high rate of speed on all road grades encountered. Gasoline motors are favored for this size truck and no diesel power will be substituted when motor replacements are necessary.

The largest haulage units now in use in the Ohio field are owned by The Jefferson Company at their Betsy Mine located in Jefferson County near Smithfield. These haulers consist of four-wheel drive tractors and are powered with 198 hp. gasoline engines and are equipped with 9:75 x 24 tires. They pull 25 ton bottom dump trail cars equipped with 13:50 x 24 tires. The clam-shell type doors on the trailers are air operated and are controlled from the truck cab. There is sufficient clearance under the doors to drop coal or gob along the road ways and fills. At the present time, a fleet of six are in operation. These trucks have a top speed of 20 m.p.h., loaded on the level, and pull a six percent grade at five miles per hour. The average load is 27 net tons and on a one-way haul of 2½ miles will make two trips per hour.

The most recent trailer purchased is equipped with coil springs and a distinct improvement is noted over the semi-eliptical type inasmuch as this unit has less side sway, less spillage, less repairs and less lost time. Spring replacements are fewer and cheaper and the fact that this unit can continue operating even with broken coils is well worth considering. Some coil breakage has been experienced, which is due to the scarcity of special alloy spring steel. The manufacturer is now experimenting with a different type of coil that will enable the use of a cheaper grade of steel. These tractor-trailer units are about 42 ft. long over all, and can turn in a 50 foot pit without backing.

In general, in the Ohio field it has been noted that the average over the entire field is 10.9 hp. per ton of clean coal hauled. This percentage is considerably greater than that of the western fields and emphasizes the immense amount of power required to cope with Ohio's rugged topography. However, unlike the west, the hilly condition aids drainage problems considerably and little trouble is encountered in keeping pits and haul roads free of water.

Shovel Tooth Design and Maintenance

By O. E. MAY
Chief Engineer
Northern Illinois Coal Corporation

SHOVEL TEETH have been the subject of considerable controversy in the coal industry. If the reason is analyzed for these differences in opinion, as to which tooth is best for any particular job, it is found that the facts involved are hard to get in a clear, concise form. Therefore, the man responsible, must use his judgment and weigh the advantages against the disadvantages of any particular tooth design that meets his requirements.

The teeth on dirt moving equipment of the Northern Illinois Coal Corp., enters the bank in present operations approximately 200,000 times, and passes through an accumulated distance of 100 to 180 miles of bank per month, per machine.

The cutting or crushing of material to be excavated occurs when more unit pressure than the material can withstand is applied. This happens at a point directly ahead of the tooth point, as it advances. Directly behind, splitting action occurs on solid material as the tooth advances into the bank.

The cutting and splitting force of a tooth produces most of its wear. Wear develops directly as the unit pressure applied to the tooth by the material, the movement of material over the tooth, and the abrasiveness or cutting ability of the material.

Operating economies of a properly designed tooth involves many things besides the cost shown in the tooth cost account. If a tooth design is correct it aids materially in the following operations; minimum use of explosives; less repairs to stripping machines; more yardage through better bucket averages and working time; the minimum of coal cutting and better recovery.

Regardless what the design of the tooth may be, it no doubt could be improved to meet specific requirements in a digging job. The best tooth is not always the tooth that gives the lowest cost. When all facts concerning a tooth's performance are not obtainable, good judgment must be used in appraising its value. Since operators must repair and conserve tooth materials during the war emergency, a study of what determines the greatest dirt moving efficiency at the least cost is important today.

Coal Pinning Machine

By C. M. GUTHRIE
Superintendent
Seneca Coal and Coke Co.

A description of this interesting machine and its use will appear in an early issue of Mining Congress Journal.

WHEELS of Government

● *As Viewed by A. W. Dickinson of the American Mining Congress*

Washington Highlights

POLITICAL THINKING—November elections may bring changes.

TAXES—Prepare to dig deeper!

LABOR BILLS—Come and go without action.

WORK OR FIGHT—Says Paul McNutt.

MANPOWER PIRACY—Steps being taken to reduce labor turnover.

MINING IMPORTANT—A.M.C. supplying data on employes essential to the industry's war effort.

SILVER—Now 100,000 tons will replace copper in industry.

MANGANESE, CHROME, TUNGSTEN—Revised specifications issued by Metals Reserve.

HELPING MINERS—Enactment of $5,000 loans sought for reopening small mines.

TRADE AGREEMENTS—Negotiations with Mexico and Bolivia involve important mineral products.

WITH the uncertain cloud of fall elections hanging on the troubled head of many a Congressman and Senator, the yearning for a summer recess pervades the atmosphere in capitol corridors as the campaign-conscious members of our National legislative bodies turn their thoughts toward the green fields, wooded hills, or sage brush and mountain vistas of the home state. Recent weeks have witnessed the fading of many of the sharp animosities of the past two sessions. Members have voiced speeches of mutual felicitation in eulogy of their records and virtues, for consumption in the home district as a counter to the vigorous campaigning of competitors which may bring new faces to Washington after November. Concern of individual members over their voting records on increased soldier pay, agricultural and labor matters, congressional pensions, taxes, in fact anything which may please or displease a constituent is clearly indicated by the anxiety they now display in their careful attendance at committee hearings and chamber sessions.

Tax See-Saw

All important to mining was the May 14 vote of 21 to 4 in the Ways and Means Committee to continue unchanged the present percentage of depletion provisions of the tax law; also retained was the option permitting producers of oil and gas to charge intangible drilling costs to expense or to capital account. There is no question that this action on the part of the committee was the direct result of a united and forceful expression of opinion from natural resource producers throughout the nation.

Thus far the status of the depletion deduction appears to be satisfactory in the House, but Treasury Secretary Morgenthau has been quoted as saying that Treasury recommendations to remove or reduce percentage depletion allowances will be renewed before the Finance Committee of the Senate.

To date Ways and Means Committee votes have provided a lowering of the individual exemption to $500 for single and $1,200 for married persons, with no change in the $400 allowance for dependents; an increase in the surtax range to 12 to 81 percent, as compared with the present 6 to 77 percent, and a normal tax of 6 percent in place of the present 4 percent.

The corporation rates voted upon in late April (reported in May issue) have since attracted much attention and criticism, especially the 94 percent excess profits tax rate and it is quite possible that the committee will reconsider and change this feature.

Labor Legislation?

With the Connally, Ball and Smith-Vinson bills shelved, there has been a minimum of interest in labor control legislation in recent weeks. However, the House Judiciary Committee late in May reported the House bill which makes robbery or extortion when employed to obstruct the transportation of commodities, a felony; in war time the President is also authorized to use the armed forces to insure the orderly transportation of goods, the mail, troops, munitions or war supplies. If and when this bill is considered on the floor of the House it is probable that efforts will be made to include an amendment providing for a 48-hour workweek without overtime pay, but it is extremely doubtful and perhaps impossible that such an inclusion could be enacted into law.

War Manpower Action

Paul V. McNutt, chairman of the War Manpower Board, struck a firm tone during the last week in May by announcing that essential workers in critical war industries will be frozen in their present jobs, and that selective service registrants will either perform qualified service in war industries or will be placed with the armed forces. In the carrying out of the order, needed men will be transferred to war industry, with the understanding that those who do not accept such service will be reported by the United States Employment Service to the local draft board for further disposition.

In carrying out the general policy of the Manpower Board, industries are expected to employ as many new workmen as possible through the facilities of the U. S. Employment Service subject to the priorities which will obtain for essential war production. Careful steps are being taken to minimize the so-called "pirating" of labor from one industry or plant to another. Plans calls for a classification of essential war industries by the War Production Board, which will in turn be used by the Employment Service in determining the essential occupational or job classifications by industry. This will be used as the basis for preferential placing of workmen. The Manpower Board's orders call for the Selective Service to instruct local boards to obtain advice from local public employment offices before classifying or reclassifying an individual skilled in a critical war occupation.

It is definitely known that the mining industries are to be the first of those considered for careful appraisal by the U. S. Employment Service. Through the American Mining Congress, data on essential employes in the mining industries are being furnished for occupational classification, and the Manpower Board is calling for all possible speed on this work in order that the full program may become operative at the earliest possible date, and before too great harm is done to the coal, iron, copper, lead, zinc, and the other strategic and essential mines, mills, smelters and reduction plants of the country.

One Hundred Thousand Tons of Silver

Last month Treasury Secretary Morgenthau arranged with the War Production Board for the transfer of 40,000 tons of silver for use as bus bars in new war production plants. He also met with Senator Pat McCarran, of Nevada, and a number of his western conferees and declared a truce under which no attempt was to be made to disturb existing silver purchase legislation.

On May 28 Secretary Morgenthau, Commerce Secretary Jesse Jones and Donald M. Nelson met again with the Senate Special Silver Committee, and the request was made by Mr. Nelson that a total of 100,000 tons of silver now held by the Treasury be made available to the War Production Board for special service in the war industries. This 100,000 tons includes the 40,000 tons for which transfer was previously arranged. It is understood that legislation will be drafted authorizing the transfer by the Treasury in order that an equivalent amount of copper may be released for urgent needs. At the same time the Treasury Secretary has repeated his assurances that the present silver buying policy will be continued for the duration of the war, thereby assuring producers of the base metals that they will continue to have the benefit of any silver values in their ores in the effort to produce the maximum amount of lead, zinc and copper.

Strategic Metal Policy

Liberalization of grade, price, payment and handling methods in the case of manganese, chrome, tungsten and other ores and concentrates by the Metals Reserve Company is expected to result in a substantially increased production of the materials so much needed for the present war effort. Elsewhere in this issue specifications for purchase of manganese, chrome and tungsten ores are reproduced. (See pages 72-73.) Announcement has also been made by the Metals Reserve Company and the WPB Minerals Branches of the appointment of over a dozen able consultants, located at accessible points in western mining regions, who will be available for conferences on development, production, financing and sale with producers and potential producers of needed metals and minerals. It is understood that an aggressive and cooperative policy will be carried on by these federal agencies in assisting producers and in securing essential materials.

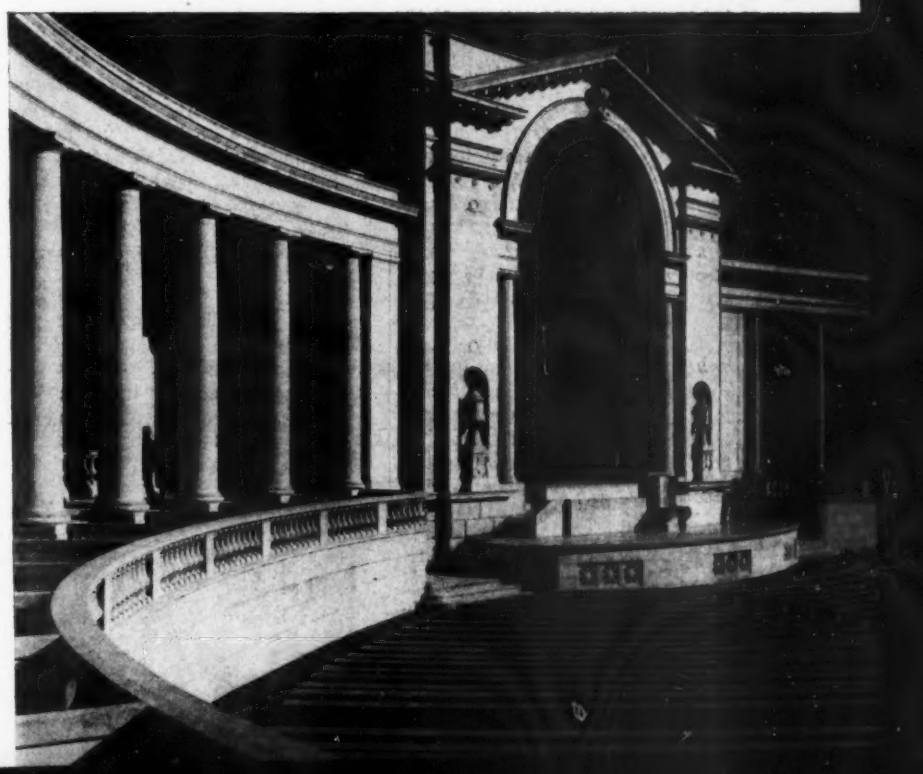
The Small Mines Loan bill, sponsored by Senator Ernest W. McFarland, of Arizona, and 16 other western Senators, has now been set for hearing on June 9. This measure, which would provide RFC loans up to $5,000 for the purpose of financing the unwatering, retimbering, rehabilitation or preliminary development of mine workings or for the sampling or assaying of ore therefrom, will be pressed for enactment by its sponsors unless the RFC finds it is practical at this time to embody the authority which the bill grants in its mine loan rules. It is possible that in view of the present need and the policies now being pursued the RFC will see fit to take such action.

Peruvian Treaty—Mexico-Bolivia

As announced on May 7 the foreign trade agreement negotiated with the Republic of Peru did not reduce the import duty on tungsten ore and concentrates. The duty on bismuth was cut by one-half, to 3¾ percent ad valorem; also affected were vanadium ores and concentrates, which were bound on the free list.

(*Continued on page 72*)

"We Here Highly Resolve That These Dead Shall Not Have Died in Vain." This appears on the arch of the Arlington Amphitheatre near Washington. It stirs visitors more than ever before and reminds the Nation of the grim task ahead to make the above epitaph a reality



DIRECT CURRENT WIRING SYSTEMS FOR CONVEYOR MINING

By W. F. ROBERTS

• ***A Tentative Report Submitted to the Power Committee Outlining General Principles and Fundamentals as Recommended by a Special Subcommittee***

A WIRING system for conveyor mining includes all feeder and return lines from the main power supply to the various machines in the unit and must also include the necessary controls, switches, grounds and protective devices that will insure safe and efficient operation. The face equipment is not stationary but is advanced each shift; the entire unit is moved and re-located periodically, some of the machines are hand-operated and all the workmen are in close proximity to the conductors; these factors introduce a number of transmission problems which require careful consideration.

The Power Committee is undertaking a study of this subject and has appointed a special subcommittee, consisting of electrical engineers of coal companies and manufacturers, to submit a report covering recommended practices. This subcommittee, at several meetings and by correspondence, have prepared the following report which is presented here to the main committee for their review and possible revision.

In preparing these recommendations it has been the intention to conform to the rulings and specifications of the U. S. Bureau of Mines which have resulted from years of investigation and experience. The Bureau publication "Schedule 2D" dated May 23, 1936, lists the requirements for the approval of storage battery locomotives and power trucks, junction boxes, and electric motor driven equipment. This schedule is used as a guide by manufacturers of mining equipment in designing and building permissible apparatus for safe use in gaseous mines. To date, however, the Bureau of Mines has limited its approval to single machines and has not enlarged its scope to include wiring system; consequently this committee report should not be misconstrued as being approved by the Bureau although their representatives as well as State Mine Inspectors have been consulted.

In the conveyor system of mining, two or more machines are in a working place at the same time; in addition, trolley wire and tracks are in most cases eliminated, thus necessitating several trailing cables for transmitting power to the various machines. The presence of a number of cables and more than one machine in a working place introduces new mechanical and electrical hazards which are very clearly described in U. S. Bureau of Mines information Circular I. C. 7160 by Messrs. E. J. Gleim and H. B. Brunot entitled, "Mechanized Mining Brings New Electrical Hazards."

Scope of Committee Report

Most of these risks can be eliminated or minimized by following certain recognized practices of safe wiring, such as reducing the number of trailing cables to a minimum; providing adequate overload protection; properly grounding equipment; using suitable distribution boxes where branch circuits are taken off the main circuit, etc.

In presenting this report it is the purpose of the Power Committee to show, by means of simple diagrams with explanatory notes, just what constitutes safe practice in direct current wiring for conveyor systems and the methods used to meet these safety requirements.

Figure 1 shows a wiring system for a typical conveyor operation and the diagrams which follow, were each chosen to illustrate the recommended manner of making some certain hook-up, common in conveyor mining. They are intended to be self-explanatory. It is obviously impracticable to include the many variations of the set-ups shown, such as the different schemes of automatic control with sequence starting, etc. However, the fundamental principles of safe wiring, as illustrated, apply equally well to all of the systems.

The manufacture of the recommended all-rubber clad cable, which has proved to be the most satisfactory type available for portable mine equipment, will, no doubt, be seriously curtailed due to the shortage of rubber, caused by the present war situation. In this event, of course, the use of a substitute will be necessary.

Importance of Grounding

The diagrams stress the importance of properly grounding each piece of electrical apparatus. Even with this precaution, a very definite hazard may be present, due to a difference of potential between the track and floor of the mine, under certain unfavorable conditions. These conditions arise when the spot for grounding the track is located at a considerable distance from the working place and when the track is not well bonded or is not in good electrical contact with the floor. Under these circumstances the difference of potential between track and floor may be of sufficient value to cause a severe shock, especially if the bottom is damp.

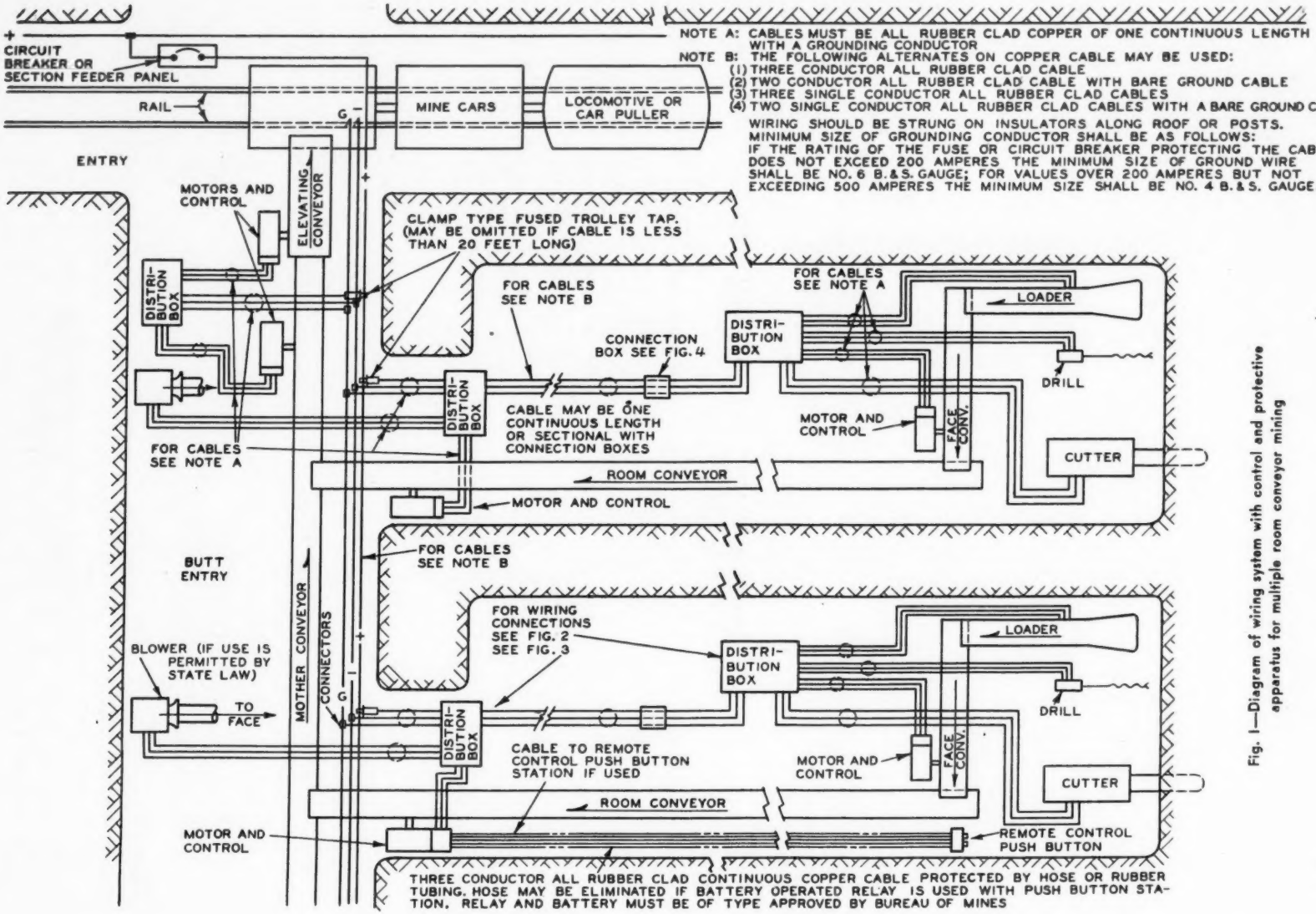

NOTE A: CABLES MUST BE ALL RUBBER CLAD COPPER OF ONE CONTINUOUS LENGTH WITH A GROUNDING CONDUCTOR
NOTE B: THE FOLLOWING ALTERNATES ON COPPER CABLE MAY BE USED:
(1) THREE CONDUCTOR ALL RUBBER CLAD CABLE
(2) TWO CONDUCTOR ALL RUBBER CLAD CABLE WITH BARE GROUND CABLE
(3) THREE SINGLE CONDUCTOR ALL RUBBER CLAD CABLES
(4) TWO SINGLE CONDUCTOR ALL RUBBER CLAD CABLES WITH A BARE GROUND CABLE
WIRING SHOULD BE STRUNG ON INSULATORS ALONG ROOF OR POSTS.
MINIMUM SIZE OF GROUNDING CONDUCTOR SHALL BE AS FOLLOWS:
IF THE RATING OF THE FUSE OR CIRCUIT BREAKER PROTECTING THE CABLE DOES NOT EXCEED 200 AMPERES THE MINIMUM SIZE OF GROUND WIRE SHALL BE NO. 6 B.&S. GAUGE; FOR VALUES OVER 200 AMPERES BUT NOT EXCEEDING 500 AMPERES THE MINIMUM SIZE SHALL BE NO. 4 B.&S. GAUGE.
CIRCUIT BREAKER OR SECTION FEEDER PANEL
RAIL
MINE CARS
LOCOMOTIVE OR CAR PULLER
ENTRY
MOTORS AND CONTROL
ELEVATING CONVEYOR
CLAMP TYPE FUSED TROLLEY TAP. (MAY BE OMITTED IF CABLE IS LESS THAN 20 FEET LONG)
DISTRI-BUTION BOX
FOR CABLES SEE NOTE B
CONNECTION BOX SEE FIG. 4
FOR CABLES SEE NOTE A
LOADER
DRILL
CABLE MAY BE ONE CONTINUOUS LENGTH OR SECTIONAL WITH CONNECTION BOXES
MOTOR AND CONTROL
FACE CONV.
CUTTER
ROOM CONVEYOR
BUTT ENTRY
MOTHER CONVEYOR
CONNECTORS
FOR WIRING CONNECTIONS SEE FIG. 2 SEE FIG. 3
BLOWER (IF USE IS PERMITTED BY STATE LAW)
TO FACE
CABLE TO REMOTE CONTROL PUSH BUTTON STATION IF USED
REMOTE CONTROL PUSH BUTTON
THREE CONDUCTOR ALL RUBBER CLAD CONTINUOUS COPPER CABLE PROTECTED BY HOSE OR RUBBER TUBING. HOSE MAY BE ELIMINATED IF BATTERY OPERATED RELAY IS USED WITH PUSH BUTTON STATION. RELAY AND BATTERY MUST BE OF TYPE APPROVED BY BUREAU OF MINES

Fig. 1—Diagram of wiring system with control and protective apparatus for multiple room conveyor mining

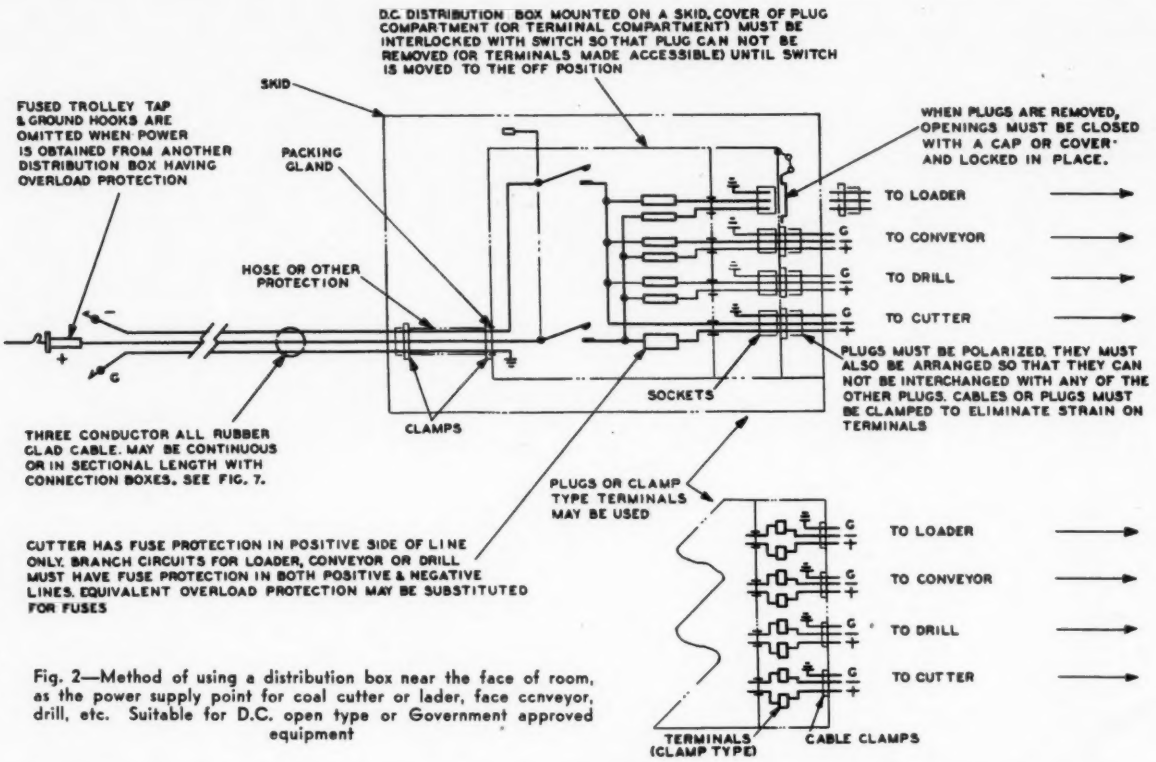

D.C. DISTRIBUTION BOX MOUNTED ON A SKID, COVER OF PLUG COMPARTMENT (OR TERMINAL COMPARTMENT) MUST BE INTERLOCKED WITH SWITCH SO THAT PLUG CAN NOT BE REMOVED (OR TERMINALS MADE ACCESSIBLE) UNTIL SWITCH IS MOVED TO THE OFF POSITION
SKID
FUSED TROLLEY TAP & GROUND HOOKS ARE OMITTED WHEN POWER IS OBTAINED FROM ANOTHER DISTRIBUTION BOX HAVING OVERLOAD PROTECTION
PACKING GLAND
HOSE OR OTHER PROTECTION
WHEN PLUGS ARE REMOVED, OPENINGS MUST BE CLOSED WITH A CAP OR COVER AND LOCKED IN PLACE.
TO LOADER
TO CONVEYOR
TO DRILL
TO CUTTER
PLUGS MUST BE POLARIZED. THEY MUST ALSO BE ARRANGED SO THAT THEY CAN NOT BE INTERCHANGED WITH ANY OF THE OTHER PLUGS. CABLES OR PLUGS MUST BE CLAMPED TO ELIMINATE STRAIN ON TERMINALS
SOCKETS
CLAMPS
THREE CONDUCTOR ALL RUBBER CLAD CABLE. MAY BE CONTINUOUS OR IN SECTIONAL LENGTH WITH CONNECTION BOXES. SEE FIG. 7.
PLUGS OR CLAMP TYPE TERMINALS MAY BE USED
CUTTER HAS FUSE PROTECTION IN POSITIVE SIDE OF LINE ONLY. BRANCH CIRCUITS FOR LOADER, CONVEYOR OR DRILL MUST HAVE FUSE PROTECTION IN BOTH POSITIVE & NEGATIVE LINES. EQUIVALENT OVERLOAD PROTECTION MAY BE SUBSTITUTED FOR FUSES
TO LOADER
TO CONVEYOR
TO DRILL
TO CUTTER
TERMINALS (CLAMP TYPE)
CABLE CLAMPS

Fig. 2—Method of using a distribution box near the face of room, as the power supply point for coal cutter or lader, face conveyor, drill, etc. Suitable for D.C. open type or Government approved equipment

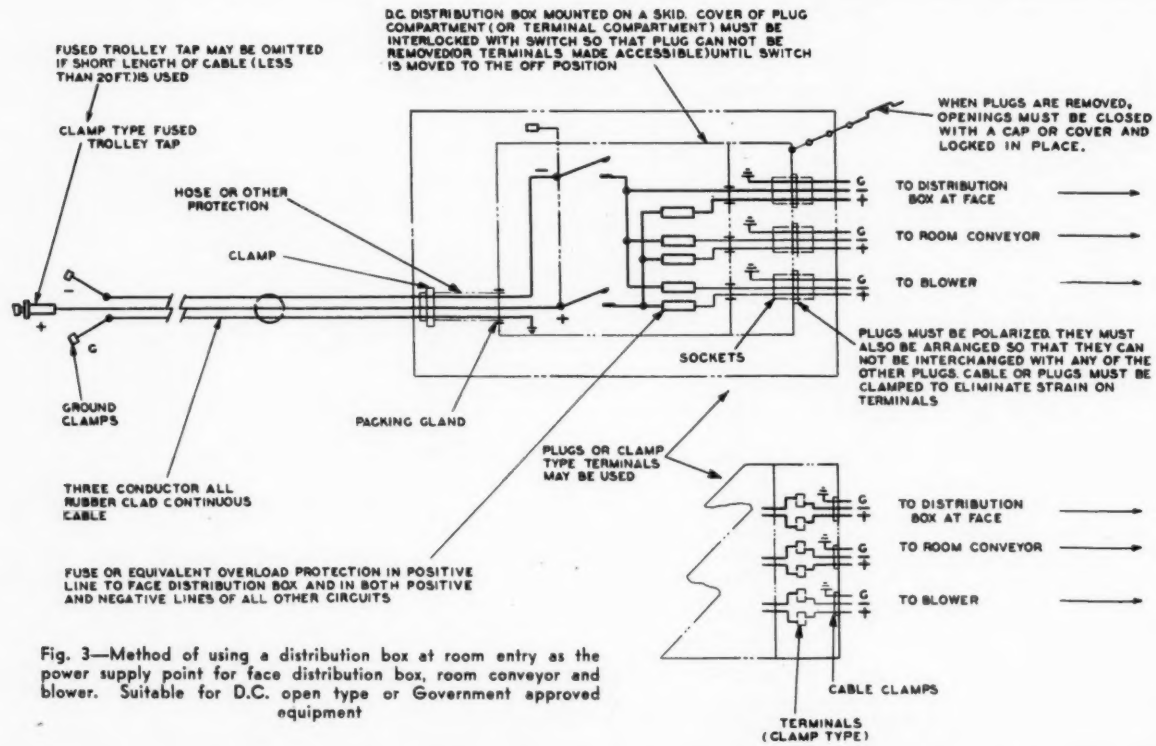

D.C. DISTRIBUTION BOX MOUNTED ON A SKID. COVER OF PLUG COMPARTMENT (OR TERMINAL COMPARTMENT) MUST BE INTERLOCKED WITH SWITCH SO THAT PLUG CAN NOT BE REMOVED(OR TERMINALS MADE ACCESSIBLE)UNTIL SWITCH IS MOVED TO THE OFF POSITION
FUSED TROLLEY TAP MAY BE OMITTED IF SHORT LENGTH OF CABLE (LESS THAN 20FT.)IS USED
CLAMP TYPE FUSED TROLLEY TAP
WHEN PLUGS ARE REMOVED, OPENINGS MUST BE CLOSED WITH A CAP OR COVER AND LOCKED IN PLACE.
HOSE OR OTHER PROTECTION
CLAMP
TO DISTRIBUTION BOX AT FACE
TO ROOM CONVEYOR
TO BLOWER
PLUGS MUST BE POLARIZED. THEY MUST ALSO BE ARRANGED SO THAT THEY CAN NOT BE INTERCHANGED WITH ANY OF THE OTHER PLUGS. CABLE OR PLUGS MUST BE CLAMPED TO ELIMINATE STRAIN ON TERMINALS
SOCKETS
GROUND CLAMPS
PACKING GLAND
PLUGS OR CLAMP TYPE TERMINALS MAY BE USED
THREE CONDUCTOR ALL RUBBER CLAD CONTINUOUS CABLE
FUSE OR EQUIVALENT OVERLOAD PROTECTION IN POSITIVE LINE TO FACE DISTRIBUTION BOX AND IN BOTH POSITIVE AND NEGATIVE LINES OF ALL OTHER CIRCUITS
TO DISTRIBUTION BOX AT FACE
TO ROOM CONVEYOR
TO BLOWER
CABLE CLAMPS
TERMINALS (CLAMP TYPE)

Fig. 3—Method of using a distribution box at room entry as the power supply point for face distribution box, room conveyor and blower. Suitable for D.C. open type or Government approved equipment

Obviously, the method of eliminating this danger is to provide an additional ground for the track near the working area and to keep the return properly bonded. An occasional check of potential between track and ground, will indicate whether the grounding condition is safe.

Definition of Terms

To have a common basis of understanding concerning the terms "junction box," "distribution box," and "connection box," the following definitions, conforming to Bureau of Mines practice, are given.

Junction Box

A junction box is a piece of apparatus providing overload protection for a single, straight-through circuit. It shall have a plug type connection for the outgoing feed cable. It shall also have a disconnect device which is interlocked with the plug so that the plug cannot be inserted nor withdrawn, nor fuses renewed, unless the disconnect is open.

Distribution Box

A distribution box is a skid mounted, portable compartment in which branch circuit connections are made to two or more machine feed cables from a single incoming feed line. Connections to machine feed cables may be made by plug type connectors or by clamp type or bolted terminals. Each machine feed cable shall be provided with overcurrent protection. Means shall be provided for disconnecting the fuses (if used) and the connectors for the machines, from any energized source of power. Interlocking shall be provided so that connections to machine feed cables can neither be made nor broken, nor fuses replaced while energized.

Connection Box

A connection box is a compartment in which electrical conections between sections of cable can be made and which provides mechanical protection for such connection. These may be made by bolting terminals to insulated terminal studs, or by other approved methods. A connection box shall be provided with two or more lead entrances.

Specification for Distribution Boxes

The requirements for a government approved distribution box from which to supply power to another distribution or junction box, cutting machine, face conveyor, and drill are as follows: (See Figs. 2 and 3 for wiring connections).

1. The electrical compartment or compartments shall be mounted on a suitable metal skid. The skid shall have handles and turned up ends for ease in moving.

2. A switch or equivalent shall be provided to open all power lines entering the box.

3. Fuses, or an equivalent overload device, shall be provided in the positive line for the main circuit (to another distribution box or a cutting machine motor circuit) and in both positive and negative power lines for branch circuits (such as for face conveyors, drills, etc.). Fuses shall be interlocked with the switch so that they cannot be renewed unless the switch is open and the fuses dead.

4. Either plugs or clamp type terminals may be used to obtain energy from the box, as specified below:

Plug Terminals

(a) Terminals shall be interlocked with the switch or so connected that they can neither be inserted nor withdrawn while the receptacle contacts are alive.

(b) A cap or suitable cover shall be provided to close and lock the opening in the receptacle when the plug is out, to prevent access to live terminals and to keep out dirt.

(c) The plug and receptacle shall each contain a grounding contact that will make on inserting the plug. The metal plug and receptacle housings shall be grounded when the plug is in position.

(d) Plugs shall be polarized so that positive and negative terminals cannot be reversed.

(e) Plugs shall be designed so that they cannot be interchanged (to assure that each machine can only be plugged into the receptacle which is connected to the proper fuses).

(f) The rating and purpose of each circuit shall be plainly marked on the distribution box by means of a wiring diagram or otherwise.

Clamp Terminals

(a) The cover of the terminal compartment shall be interlocked with the switch so that the switch must be in the "off" position before the terminals are accessible.

(b) A diagram, identifying each terminal and indicating its specific function, must be permanently attached to the inside cover of the connection compartment. This diagram should give the maximum rating of the fuse for each terminal; polarity of each terminal as "line," "return" or "ground"; and the name of circuit for which the terminal is intended as, "Cutting Machine," "Drill," "Conveyor," etc.

5. Cables for each machine obtaining power from the box shall have a grounding conductor for grounding the frame of the apparatus to the distribution box.

6. A suitable clamp shall be provided for each cable to prevent any strain coming on the clamp type terminals or on the plug while it is in its receptacle.

(NOTE: The remainder of this report, covering Connection Boxes and Drill Connections on Cutting Machines, will appear in the July JOURNAL.)

AMERICAN MINING CONGRESS

1942 COAL MINE MODERNIZATION YEARBOOK

(Complete papers and discussion of the '42 Coal Convention)

Off the Press July 15—Order Your Copy Today

SAFETY COMMITTEE ORGANIZED

• *Greater Safety in Coal Mining Can be Achieved Through a Complete Cooperation of All the Units of the Industry*

A SAFETY COMMITTEE is being organized by the Coal Division of the American Mining Congress with the purpose of bringing together all the units of the coal industry, in the interest of promoting safety and efficiency. The committee personnel will include operators from the various producing coal fields and representatives of the U. S. Bureau of Mines and the State Mining Departments; in addition the other Coal Division committees will assist by preparing reports on certain phases of safety which require technical study or specialized experience.

Preliminary Meeting of Committee

An organization meeting was held at Pittsburgh on May 15 for a preliminary consideration of plans and procedure, and the following were present: L. C. Campbell, Koppers Coal Division, Committee chairman; Harry M. Moses, H. C. Frick Coke Co., Coal Division chairman; E. B. Agee, Buckeye Coal Co.; S. M. Cassidy, Weirton Coal Co.; C. W. Grove, U. S. Bureau of Mines; James Hyslop, Hanna Coal Co.; Richard Maize, Pennsylvania Department of Mines; T. F. McCarthy, Clearfield Bituminous Coal Corp.; G. B. Southward, American Mining Congress.

At this meeting, after a thorough discussion and expressions of opinion by all present, it was agreed that the committee could perform a very constructive service for the coal industry and it was especially recommended that the personnel should include representatives from the Appalachian fields, the Central States, Anthracite, and the Rocky Mountain Districts. In view of present travel difficulties, it was suggested that sectional meetings be held at several convenient central points, and that these should be called as soon as possible in order to complete the organization and get the committee work under way.

Proposed Scope of the Committee

It was the concensus of the meeting that the purpose of the Safety Committee shall be educational; to summarize and clarify safety ideas; to act as a clearing house on safety practices; to create a medium for reconciling controversial problems; to conduct research for determining the proper approach to the elimination of certain hazards, and to bring to the attention of the industry recommended methods for reducing accidents. It is not the intention to have the committee set up rules and regulations; these are matters for the Federal and State Mining Departments, but it is the desire of the committee to cooperate in every way with governmental agencies so that all possible knowledge and experience may be brought to the solving of safety problems.

Various Agencies Will Cooperate

The elimination of many coal mining hazards involves technical research and the Bureau of Mines has worked for a number of years in its laboratories and experimental mines, developing data on accident causes and means to combat them. Coal companies have availed themselves of these data and have further contributed to the safety movement through the practical application of the principles developed. It is the desire of the committee to continue this procedure and to stimulate further research by enlisting the experience of the engineers, operators, and manufacturers on the other committees of our Coal Division who are studying various phases of mine operation.

This issue of the MINING CONGRESS JOURNAL presents a case in point as to what the Coal Division Committees are doing. A tentative report on conveyor wiring is published, based on the most recent knowledge and developments in methods and equipment for an efficient electric transmission system, with complete protective devices for the safety of the men. Another example is the study now being conducted to investigate causes of mine roof deterioration and to discover preventive measures.

Solution of Safety Problems

Accident prevention may be divided into two broad general classifications; the first involves equipment—methods and materials of installation, protective devices and safeguards — while the second relates to the conduct of the men—the following of correct practices and observance of safety rules. These two classifications are, of course, closely inter-related but in each case the elimination of hazards has a different approach. The design and installation of safe equipment is to a large degree based on engineering facts and principles, while rules and safety procedure are, to a certain degree, matters of opinion. Controversies, of course, have arisen and will continue to arise because, both in matters of equipment and conduct, there are usually several equally good ways of accomplishing the same end. However, it is the aim of the Safety Committee to use every possible agency to find the best solution of factual and controversial matters.

One of the greatest problems, which is by no means new, is to obtain a balance between safety and practicability; to avoid unnecessary expense but to do the things that are clearly indicated as needful. The committee is fully conscious that difficulties of this nature will arise but there seems to be only one answer: that everyone concerned approach such problems with an unbiased mind, and a sincere desire to keep our mines operating with the fewest possible injuries to the men employed.

Further Safety Progress

For the past 10 years the coal industry has made an excellent record in accident reduction and a "safety consciousness" has been developed in the executives and down through the rank and file. Some people may believe that everything possible to be done has already been done, but since accidents continue to occur, we know that further progress can be made. And to those who feel that the cost of additional effort will involve an undue expense, we can only point out the fact that safety has proved a sound financial investment and that mine operators would be very unwilling to discontinue the protective measures that have already been put into effect.

PERSONALS

S. S. Bruce, general traffic manager of Koppers Company, its subsidiaries and affiliates, has been given a leave of absence to become assistant director of the Division of Railway Transport in the Office of Defense Transportation for the U. S. Government, with headquarters in Washington. He will be associated with **Victor C. Boatner**, director of the division under **Joseph B. Eastman**, director of the Office of Defense Transportation.

F. D. DeVaney, Rolla, Mo., recently joined Pickands Mather & Company's ore research department, with headquarters at Hibbing, Minn. Mr. DeVaney was formerly with the U. S. Bureau of Mines, Rolla, Mo.

Martin W. Urquhart, New York City, has been appointed treasurer of the Phelps Dodge Corporation, succeeding the late James E. Fisher.

Luther M. Hall recently ended his long period of service with the United States Coal & Coke Company, to become Associate Federal Coal Mine Inspector for the Bureau of Mines, with assignment to the Pittsburgh, Pa., district.

Robert L. Pate, chief designing engineer of McNally Pittsburg Mfg. Corp., has been promoted to the position of chief assistant engineer. He will be located at the company's new office in Pittsburg, Kans.

Ernest N. Patty, general manager of the McRae-Patty mining interests in Alaska, Yukon Territory and British Columbia, recently travelled by plane from Seattle to Fairbanks, Alaska, where this organization has its head offices. Mr. Patty recently completed a trip to Washington, D. C., and Ottawa, Canada.

Angus R. Brown, ventilation superintendent, Coal Mining Division, Tennessee Coal, Iron & Railroad Company, Jefferson County, Ala., has been awarded a service medal by the company in recognition of 45 years of continuous service.

Donald Nelson, Chairman, WPB, recently announced the formation of a Resources Protection Board, which is charged with the recommending of precautions against Sabotage, bombing and invasions of vital industrial centers. It will coordinate its activities with the Army and Navy and other agencies' protective measures, including the related work of the Bureau of Mines. The new Board will be headed by **William K. Frank** of WPB's production division. The other members include: **Colonel Carl G. Richmond**, War Department; **Joseph Fennelly**, Navy Department; **Phillip Bastedo**, OCD; and **William J. Kearny**, WPB. Resources analysis will be directed by **Emerson Ross** of WPB's statistics division and **J. W. Fesler** of WPB will be secretary to the board.

Edward J. Bloom, Wallace, Idaho, mining lawyer and gold dredge operator, has been appointed to the Naval Air Corps specialists reserve and ordered to active duty at the training school at a Naval Air Station. Mr. Bloom has closed his law office "for the duration," but the dredges are still operating.

William H. Browne has been named research engineer on the technical staff of Battelle Memorial Institute, Columbus, Ohio, where he has been assigned to the division of fuel research. Mr. Browne, a graduate in mechanical engineering of Rensselaer Polytechnic Institute, was associated with the Caterpillar Tractor Co., of Peoria, Ill., prior to joining the Battelle staff. He is a member of the American Institute of Mining and Metallurgical Engineers and Sigma Xi, national honorary science society.

J. R. Kirby, Red Jacket Coal Corporation, has been moved from the Keene Mountain mine of Buchanan County, Va., where he was superintendent, to Red Jacket, W. Va., where, as assistant to the president he is in charge of all operations.

Eugene S. Lieding has been made assistant mine foreman of No. 63 mine of Consolidation Coal Company of Monaga, W. Va.

Grover Holt, mining engineer, effective April 1, 1942, became affiliated with the Cleveland-Cliffs Iron Company iron mines. Mr. Holt had been with Butler Brothers iron mining offices at St. Paul, Minn., and prior to that was on the Cuyuna iron range of Minnesota.

Walter Geist, president of the Allis-Chalmers Manufacturing Co., announced that **William C. Johnson**, sales manager of the crushing and cement division, has been named manager of the Allis-Chalmers general sales organization. Until his election as president, Mr. Geist directed the general sales organization, first as general representative and later as vice president. As general sales manager, Mr. Johnson will direct the sales of 1,600 different products and the operations of 60 district offices.

Ralph R. Richard, formerly electrical engineer for the Union Colliery Co., Dowell, Ill., is now associated with the Allen & Garcia Company, Chicago.

John Sirockman, Pursglove Coal Mining Co., Pursglove, W. Va., has been promoted from assistant mine foreman of No. 15 mine to superintendent.

George A. Schultz, who has been in charge of operations for the Liberty Fuel Company at Latuda, Utah, for the last 25 years, has been transferred to Salt Lake City as general manager of the company.

Gloyd M. Wiles, formerly of Salt Lake City, Utah, has been appointed consulting engineer for the St. Louis Smelting & Refining Co., with headquarters at St. Louis, Mo. For the past seven years Mr. Wiles has been general manager of the Park City Consolidated Mines Co. at Park City, Utah. He is also vice president and a member of the Board of Directors of that company. **Allen R. Reiser** of Salt Lake City, chief geologist of the Park City Consolidated Mines Co., was recently named general superintendent of mines. Mr. Reiser was formerly assistant to Mr. Wiles.

Announcement has been made of the appointment of **Jonathan Garst** to represent the WPB Materials Division in Alaska. Mr. Garst, who was loaned to WPB by the Agricultural Marketing Service, will work with the Bureau of Mines and the Geological Survey who are conducting an extensive survey of Alaska for deposits of critical minerals. As new deposits are uncovered by the surveying agencies, Mr. Garst will assist in getting mines into production and their output on the way to shipping centers.

Defense Transportation Director Eastman has announced the appointment of **A. T. Wood**, of Cleveland, as full-time assistant on Great Lakes carriers. Mr. Wood, who has been serving part time in this capacity since last January, will have offices in the Terminal Tower, Cleveland.

Joseph W. Walton, vice president, Hillside Mines, Inc., Prescott, Ariz., was recently appointed Captain in the Corps of Engineers, U. S. Army. Captain Walton is a member of the American Mining Congress, and in civilian life was always interested in legislation affecting the mining industry.

Chas. M. Shoffner, president, Allegheny River Mining Co., Kittanning, Pa., recently announced the promotion of **Russell Woodall** from superintendent of Mohican Mine to general superintendent of the company, with office at Kittanning, Pa. Mr. Woodall has been in the service of the company 14 years, receiving successive promotions in supervisory positions at the Cadogan and Mohican Mines. **Clyde A. Crooks** is appointed superintendent of Mohican Mine succeeding Mr. Woodall.

Peter Warhol, Cooley, Minn., mining engineer with Butler Brothers iron mining operations on the Mesabi range, has been transferred to the executive offices in St. Paul, Minn. O. J. Anderson has succeeded Mr. Warhol in the Butler mining operations on the Mesabi range.

Dr. C. E. Needham, president of the New Mexico School of Mines at Socorro, resigned his position on March 30. His resignation became effective April 30.

George J. Mitchell has been named chief engineer of the Powhatan Mining Co., Powhatan Point, Ohio.

R. W. Fox, formerly superintendent, Rail & River Coal Company, Bellaire, Ohio, has been appointed superintendent of the Powhatan Mining Co., Powhatan Point, Ohio.

Howard Wills has been made section foreman for No. 93 mine of the Consolidation Coal Company, Jordan, W. Va.

H. B. Husband became manager for the Consolidation Coal Company's Kentucky Division, with headquarters at Jenkins on January 1, 1941, and resigned on March 23, 1942. K. V. Snyder, assistant then to Mr. Husband, has been named to succeed him.

C. P. Harvey, formerly master mechanic, has been named superintendent of the Adelaide-Crown mine near Golconda, Nev.

John M. Rogers, vice president and manager of the Lodestar Mining Co., which recently sold its property at Mojave, Kern County, Calif., to Golden Queen Mining Co., has left Mojave and is now in Mexico.

Hugh R. Van Waggenan, mining engineer of Los Angeles, has been appointed consulting engineer for the Lead-Zinc Section of WPB.

Frank Lacare was recently made a section foreman by the Simpson Creek Collieries Company, Galloway, W. Va.

The Metals Reserve Company has appointed a staff of consultants who are available to confer with mineral producers in connection with the development, production and sale of strategic, critical and essential metals and minerals now being sought as an aid to the war effort. The consultants now named who will be available at their respective addresses are: **Robert Linton**, Los Angeles; **Jay A. Carpenter**, Reno, Nev.; **James W. Wade**, Salt Lake City; **Charles F. Willis**, Phoenix, Ariz.; **Orville Whittaker**, Denver, Colo.; **R. D. Leisk**, Wallace, Idaho; **Ira Joralemon**, San Francisco; **Earl K. Nixon**, Portland, Ore.; **Francis A. Thomson**, Butte, Mont.; **M. W. Hayward**, El Paso, Tex.; **Dr. Milnor Roberts**, Seattle, Wash., and **Olaf Rove**, Washington, D. C., is consultant under the War Production Board, Mineral Branch.

Theodore P. Scott, treasurer and assistant secretary of the Lehigh Coal and Navigation Company, Philadelphia, Pa., has been elected vice president and treasurer of the company.

A. I. Levorsen, distinguished petroleum geologist of Tulsa, Okla., was the featured speaker at the sixty-eighth annual commencement of the Colorado School of Mines, May 1. During the commencement exercises, Mr. Levorsen was awarded the honorary degree of doctor of engineering from the Colorado School of Mines.

John F. Crowley has been named examining engineer for the Mining Division of Reconstruction Finance Corporation and is now in Washington, D. C. Mr. Crowley was formerly superintendent of old and new Brunswick shafts of Idaho Maryland Mines Corp. **John Palecek** has been named superintendent of West Coast Mines, Inc., operating near Winnemucca, Nev., succeeding John F. Crowley. Mr. Palecek served as mill superintendent of West Coast Mines under Mr. Crowley.

Leonard E. Adams, vice president and general manager, Spring Canyon, Royal & Standard Coal Companies, Salt Lake City, Utah, has been elected president of the Utah Coal Operators Assn. He succeeds **Paul L. Shields**, vice president and general manager, U. S. Fuel Co. Directors elected were: **A. B. Foulger**, manager, Lyon Coal Company; **M. Heiner**, president, Utah Fuel Company; **A. F. Keyser**, president, Independent Coal & Coke Company; **R. H. Harmer**, vice president, High-Heat Coal Company; **L. R. Weber**, president, Liberty Fuel Company, and **E. L. Cropper**, manager, Chesterfield Coal Company. **B. P. Manley** was again chosen executive secretary.

Ira L. Wright, general manager, Black Hawk Consolidated Mines Co., Silver City, N. Mex., was a recent visitor to New York and Washington.

Julius Domico has been made assistant mine foreman at No. 63 mine of the Consolidation Coal Company, Monaga, W. Va.

George C. Heikes has been appointed Chief of the Zinc Branch by A. I. Henderson, Director of Materials for the War Production Board. Mr. Heikes, who succeeds David Uebelacker, is a graduate of Lehigh University and a mining engineer and geologist. Coming to the WPB from the National Lead Co. in the fall of 1940, he has had a wide range of experence including service in foreign countries.

N. P. Rhinehart, chief of West Virginia's state department of mines and minerals, was named president of the Mine Inspectors Institute of America, at the recent meeting in Lexington, Ky. He succeeds Thomas Moses of Pittsburgh.

D. M. Kelly, vice president, in charge of operation, Anaconda Copper Mining Co., recently announced the following changes in personnel of the company: **W. H. Hoover**, formerly western general counsel, general counsel of the company; **Clyde E. Weed**, formerly general manager of mines, was made vice president in charge of mining operations; **Frederick Laist**, formerly general metallurgical manager, was made vice president in charge of metallurgical operations. All three have been connected with the Anaconda Copper Mining Company for many years.

J. D. Francis, president, Island Creek Coal Company, has been appointed to represent the coal industry on an Advisory Board of 54 authorities in various industries, created by the Army Quartermaster Corps. The board will assist the Resources Division of the Office of the Quartermaster General in the production of various commodities.

— *Obituary* —

Harry A. Thorne, former superintendent of the Chino Mines Division, Nevada Consolidated Copper Corp., died May 25 in San Diego, Calif. Mr. Thorne retired from his position on April 1, this year, following 36 years active service at the Chino Mines, Santa Rita, N. Mex. Mr. Thorne contributed in a large measure to the success of this large open pit copper mining operation in New Mexico, and his sudden death is mourned by western mining men.

Robert F. Vogt, chief consulting engineer of the Allis-Chalmers Mfg. Co., since 1937 and an employe of the company for 36 years, died April 17 after a week's illness. Mr. Vogt's professional career began in the United States about 40 years ago, when he came here from Switzerland, where he was born. He was a graduate of the Swiss Polytechnicum at Zurich. He joined the Allis-Chalmers organization in 1907 as a mechanical engineer.

NEWS and VIEWS

METALS RESERVE OFFERS GUIDANCE TO DOMESTIC MANGANESE ORE PRODUCERS

Information describing in detail the specifications, price schedules, conditions of shipment and delivery, sampling and analysis, which will be included in contracts for the purchase of manganese ores has been announced by the Metals Reserve Company. Contract applications may be obtained by writing Metals Reserve Company, 811 Vermont Avenue, N. W., Washington, D. C. All the information called for on the application form must be supplied before consideration can be given to granting a contract.

The terms under which Metals Reserve Company will purchase domestic ores are subject to change without notice, and the terms and provisions of each contract will be based on conditions and circumstances existing at the time of acceptance. The policies herein outlined do not apply to ores originating outside the limits of continental United States.

Quantity: One thousand to 10,000 long tons per contract. Contracts in excess of 10,000 tons may be obtained as a result of individual negotiations, provided reliable and complete engineering data submitted by the applicant warrant a contract for a larger quantity.

Term of contract: Deliveries must be completed within 18 months of date of contract. If delivery of 20 percent of the tonnage contracted for has not been made within six months of date of contract, buyer may cancel contract forthwith.

Quality: Purchases of domestic manganese ores will be of three grades with the specifications shown in table.

(*a*) *Black oxide ores:* The schedule of prices and the terms and conditions herein refer to black oxide ores of manganese.

(*b*) *Concentrates:* Manganese concentrates to be acceptable under this schedule must be nodulized or sintered.

(*c*) *Carbonate ores:* Manganese carbonate ores will be accepted under this schedule only if calcined.

Size of ore: None in excess of 12 in. and not more than 25 percent to pass a 20-mesh screen.

Buyer may reject any shipment which does not conform to the applicable requirements and specifications as set forth above.

(*d*) *Price:* Effective May 4, 1942, contracts will be considered on the following schedule for domestic ores, within continental United States (excluding Alaska); all prices per long ton (2,240 lbs.) of dry weight, f.o.b. cars at stockpile designated by buyer.

"High Grade"—Base price, $48 per long dry ton for ore containing 48 percent manganese with an increase of $1 per ton for each unit (22.4 lbs.) in excess of 48 percent; fractions prorated. "High Grade" ore containing not less than 48 percent manganese but otherwise falling below specifications but within the limits hereinafter set forth will be accepted subject to the following penalties:

Iron—Up to 10 percent maximum with a penalty of 1 cent per unit for each percent in excess of 7 percent; fractions prorated;

Silica—Up to 15 percent maximum with a penalty of 1 cent per unit for each percent in excess of 10 percent; fractions prorated;

Alumina—Up to 10 percent maximum with a penalty of 1 cent per unit for each percent in excess of 6 percent; fractions prorated;

Phosphorus—Up to 0.30 percent maximum with a penalty of 1 cent per unit for each 0.03 percent in excess of 0.18 percent; fractions prorated.

"Low Grade A"—Base price, $35.20 per long dry ton for ore containing 44 percent manganese with an increase of 80 cents per ton for each unit (22.4 lbs.) in excess of 44 percent; fractions prorated.

"Low Grade B"—Base price $26 per long dry ton for ore containing 40 percent manganese with an increase of 65 cents ($.65) per ton for each unit (22.4 lbs.) in excess of 40 percent; fractions prorated. Ore containing a minimum of 35 percent manganese will be accepted under this schedule with a penalty of $1.30 per

		"High Grade" Percent	"Low Grade A" Percent	"Low Grade B" Percent
Manganese	Minimum	48.0	44.0	40.0 (*)
Alumina	Maximum	6.0	10.0	No Maximum
Iron	Maximum	7.0	10.0	No Maximum
Phosphorus	Maximum	0.18	0.30	0.50
Silica	Maximum	10.0	15.0	No Maximum
Zinc	Maximum	1.0	1.0	1.0

* Under "Low Grade B," manganese ore will be accepted to 35.0 percent minimum under penalties hereinafter prescribed.

U. S. BUREAU OF MINES

At one of the iron mines in Minnesota use of curved rails as forepoles is required in a sublevel caving drift

ton for each unit (22.4 lbs.) less than 40 percent; fractions prorated.

In addition to the above prices, an allowance will be made for each long ton shipped equal to the freight tariff per long ton from Seller's nearest convenient rail station to buyer's stockpile.

The cost of sampling and analysis by the buyer, weighing, and unloading onto stockpile will be for the account of buyer.

Under the contract, each lot will be priced under the grade within which the specifications fall. Thus a lot carrying 45 percent manganese but also 0.50 percent phosphorus would be priced as "Low Grade B."

Shipment and Delivery: Seller will give such advice regarding shipment and arrival as buyer may require at least 10 days prior to shipment of the ore from point of loading onto railroad cars; otherwise, any demurrage at the stockpile will be for seller's account.

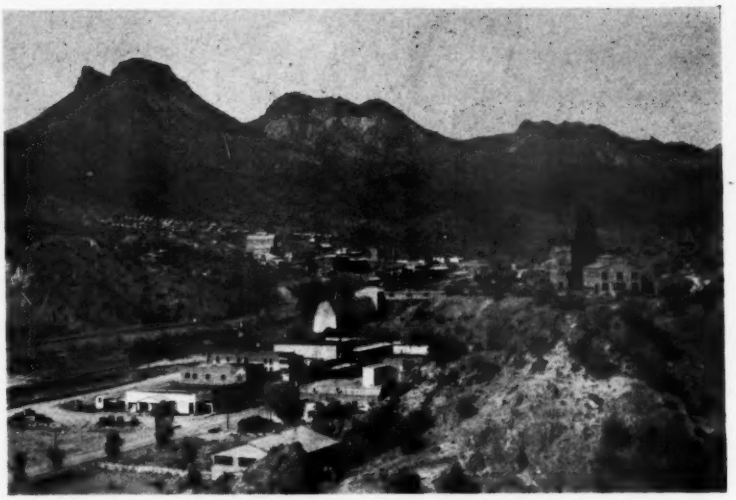
Shipment will be made in flat-bottom gondolas, if available, in lots of not less than one carload, to the stockpile designated by buyer. Seller will prepay the freight to such stockpile, where the ore will be weighed in cars, light and loaded, on track scales, and sampled for moisture. The lot will be sampled as unloaded and upon receipt of analysis, buyer will advise seller as to whether the ore is acceptable and under what classification.

If the lot is ascertained to be unacceptable under the above specifications, seller will not be entitled to any allowance for prepaid freight and will be held responsible for the removal of this shipment of ore from the stockpile location. Upon failure so to remove the ore within 15 days of due notice, buyer may, at its absolute discretion, remove such ore and the cost of such removal shall be for seller's account; or buyer may, at its option, otherwise dispose of such ore without any liability therefor. In the event that seller fails to repay buyer for the cost of removal within 15 days after notice, buyer may cancel the contract forthwith.

Payment: As soon as moisture and analysis determinations are received, buyer will promptly pay seller in accordance with the weight certificate and the above schedule.

Weights: The weight paid for will be net railroad track scale weights (weight of loaded car less weight of empty car), less moisture as determined by standard price.

Sampling and Analysis: Each lot will be sampled at the time of unloading onto stockpile by a sampler designated by buyer, three samples being taken, one each for seller, buyer and umpire, and analysis made for manganese and other guaranteed elements. Usual provisions will be made for splitting limits and settlement by average of seller's and buyer's analyses, or by trade practice if samples are sent to umpire. Moisture samples will be taken in accordance with standard practice. Seller may have representative at sampling at his own expense.



The business center of one of Arizona's copper mining camps is not far distant from the main production shaft

Chrome Ore Specifications Revised — "New Tungsten Producer" Defined

Metals Reserve Company announced on May 25 the revised specifications and price schedules for the purchase of domestic chrome ores. As heretofore, contracts will be made for quantities of 1000 to 10,000 long tons, 20 percent of the contract tonnage to be delivered within six months and the full quantity within 18 months. Contracts in excess of 10,000 tons may also be made by individual negotiations.

Base price for "High Grade" is set at $40.50 per long dry ton, with an increase of 90c per ton for each unit Cr_2O_3 in excess of 45 percent, and an increase of $1.50 per ton for each tenth increase in chrome-iron ratio to a maximum of 3.0 to 1.

Base price for "Low Grade A" is $28, with the same premiums for increases in chrome content or chrome-iron ratio above the minimum specifications. Base price for "Low Grade B" is $24, with an increase of 60c per ton for each unit Cr_2O_3 in excess of 40 percent.

Chrome ore running as low as 35 percent Cr_2O_3 will be accepted under the Low Grade A or Low Grade B classification with penalties of $1.40 or $1.20 per long dry ton, respectively, for each unit (22.4 lbs.) of Cr_2O_3 under 40 percent. The chrome content of any ore is 68.4 percent of its chromic oxide (Cr_2O_3) content.

The seller must prepay freight to the nearest government stockpile, but will be reimbursed upon acceptance of each lot. Costs of sampling and analysis, weighing and unloading, are also defrayed by the Metals Reserve Company.

New Tungsten Producers Get $24.00 f.o.b. New York and Salt Lake Cities

To aid further in stimulating the domestic production of tungsten, Metals Reserve Company announces that its present domestic price policy of $24 per dry short ton unit of WO_3 will remain in effect until December 31, 1943. "Eligible producers" and "new producers" of tungsten may participate in this program upon their compliance with certain conditions.

An "eligible producer" is defined as a domestic producer who in the year 1941 produced not less than 10 but not more than 100 tons of 60 percent WO_3 concentrates, or tonnage of lower grade material having a recoverable content of not less than 600 but not more than 6,000 units of WO_3, and who will undertake in writing with Metals Reserve Company to produce tungsten at maximum capacity until December 31, 1943, in order to meet the urgent demand for tungsten for war requirements. A "new producer" is defined as a domestic producer who in the year 1941 produced less than 10 tons of 60 percent WO_3 concentrates, or tonnage of lower grade material having a recoverable content of less than 600 units of WO_3.

PURCHASE SPECIFICATIONS OF CHROME ORE

	"High Grade"	*"Low Grade A"*	*"Low Grade B"*
Chrome (Cr_2O_3)—Minimum	45.0%	40.0%*	40.0%*
Silica—Maximum	11.0%	13.0%	No maximum
Phosphorus—Maximum	0.20%	0.50%	No maximum
Sulphur—Maximum	0.50%	1.00%	No maximum
Chrome (cr)—Iron (Fe) Ratio—Minimum	2.5 to 1	2.0 to 1	No minimum

* Under *"Low Grade A"* and *"Low Grade B,"* chrome ore will be accepted to 35.0% minimum under penalties hereinafter prescribed.

Size of ore: None in excess of 12 inches.

Application forms, when properly filled in and mailed to Metals Reserve Company, 811 Vermont Ave, N. W., Washington, D. C., will assist producers to qualify as "eligible producers" or "new producers," respectively.

Metals Reserve Company will pay $24 per dry short ton unit of WO_3, f. o. b. railroad cars New York for domestic tungsten concentrates containing 60 percent WO_3 from scheelite and 65 percent WO_3 from Wolframite, to be delivered in lots of one ton or more. Detail information regarding ores not meeting the specifications can be obtained from Metals Reserve by writing to above address.

Producers desiring to sell domestic tungsten ores, low and high grade tungsten concentrates, middlings and tailings at the tungsten treatment plant to be erected at Salt Lake City, Utah, may do so upon the terms and conditions hereinafter enumerated. The United States Vanadium Corporation will act as Agent and Operating Manager of this plant for Metals Reserve Company. Shipments will be received at the plant and will be paid for on the following basis:

For material containing from 3 to 15 percent tungsten trioxide (WO_3), payment will be made for 90 percent of the contained tungsten trioxide (WO_3) at $24 per short ton unit, dry weight, delivered at plant, either by truck or railroad, less a flat treatment charge as provided in the contract, depending on the tungsten trioxide content.

Tungsten Area in Colorado Opened for Leasing

An area of tungsten mining claims near Boulder, Colo., closed to development for many years because of legal difficulties (which have recently been removed), is now open for leasing. Joseph H. Rodgers, Sullivan Bldg., Boulder, Colo., represents the owners in all leasing negotiations.

Pride of the West Mill to Increase Capacity

Equipment will be installed during the summer to increase the capacity of the Pride mill, in the San Juan mining district, Colorado, from 50 to 100 tons per day. The small but modern plant, designed by the Denver Equipment Co., is operated by a push button electric control system, located in a glass enclosed office within the plant. Operations have been maintained since 1940, but a fire at the mine last winter forced a suspension of production. Buildings destroyed by fire have been rebuilt and necessary new equipment has been installed and lead-zinc production is expected to reach capacity during the latter part of the year. Ralph Shimmin is in charge of operations.

Manganese Ore From California

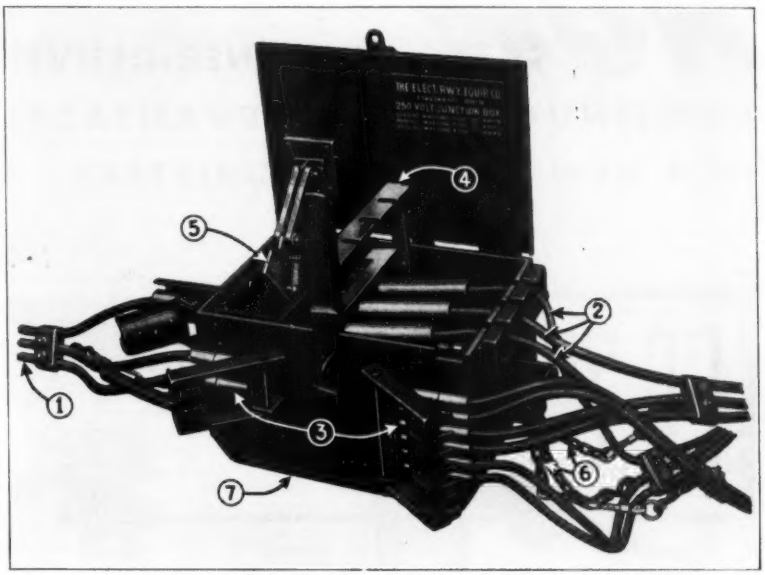
Production of high grade manganese ore is being gradually increased at Whedon manganese mine near Glamis, Imperial County, Calif. Shipments are being made to the government stockpile in Arizona. About 15 men are employed. V. B. Whedon, Bank of America Bldg., Beverley Hills, Calif., is in charge of operations.

Coal Mining Company Building Houses to Save Tires

The Red Jacket Coal Corporation is constructing 50 new company houses at Wyoming, West Virginia, and also at its property at Mullens, to help its employes conserve their automobiles and tires, officials of the company announced recently.

Forty homes will be erected at Wyoming and ten will be built near Mullens. This plan will permit miners and their families to live closer to the mine. It was explained that tire rationing will work a hardship upon many workers who have to travel any distance to work.

WANTED TO BUY, cash, one used Mine Locomotive, 15 or 18 Ton, not over 30" high, 250 Volt DC, for 42" or 44" gauge, in good condition. Address Box 100, Mining Congress Journal, 309 Munsey Building, Washington, D. C.



The ELRECO No. 1228 JUNCTION BOX for D.C. circuits is the essential safety link between the power source and the coal mining equipment.

7 Features Guarantee Safe and Efficient Service

No. 1. 3-Wire incoming power circuit cables (Pos., Neg. & Safety Ground). Safety chain and clamp relieves all strain on cable terminals.

No. 2. Out-going positive cables for machine, loader and drill circuits, equipped with removable socket connectors having insulated handles.

No. 3. Pin and socket type connectors for all negative and safety ground cables; mounted on the outside of box to secure complete separation from positive circuits.

No. 4. Safety lever which must be lowered before main switch can be closed. This lever automatically locks all terminal connections in position and prevents any circuit being opened under load.

No. 5. Quick Break Switch operated by the opening or closing of hinged junction box lid.

No. 6. Detachable strain chains and clamps for each individual circuit and which prevents any strain on cable connector terminals.

No. 7. Bottom skids to facilitate moving of box to different locations.

Standard equipment includes 200, 100 and 35 ampere 250-volt enclosed fuses —solder type terminal connections eliminate necessity of all vulcanizing or splicing of cables, and 28" height of box permits use in low coal seams.

The Electric Railway Equipment Co.

2900-18 Cormany Ave. **Cincinnati, Ohio**

Protection for Mines Against Sabotage

A mine security program designed to protect the nation's mines from sabotage effort has been announced by Interior Secretary Ickes. The program will be coordinated with the activities of other governmental agencies. Tentative plans submitted by Bureau of Mines' Director Sayers, called for the immediate setting up of a specially trained field force in all the mining areas of the nation. A Division of Mineral Production Security is being organized in the Bureau of Mines' Health and Safety Branch under Dan Harrington. The Coal Mining Section of the new Division will inventory coal mines and inaugurate security measures. Likewise, a Metal and Non-Metallic Mining Section will establish a program for such mines in the United States.

The work of both sections will be closely coordinated with other units of the Bureau, including the Safety Division, the Coal Mine Inspection Division and the Explosives Control Division. The established mine safety districts throughout the nation will serve as directing centers for these activities, although the personnel will be directed from Washington.

NOW... GARDNER-DENVER CONTINUOUS FEED ADVANTAGES IN A NEW 3-INCH DRIFTER!

CF 79

Controls are always within easy reach of the drill runner.

LESS vibration—far less wear—unusually low maintenance requirements—these are the proved benefits of Gardner-Denver Continuous Feed Drifters. Now these same advantages are available in a new 3-inch drifter—the Gardner-Denver CF79—designed for medium ground where high drilling speed and light weight are essential.

CF89H

Here is the 3½-inch Gardner-Denver CF89H Drifter—the machine which opened the eyes of operators to a new high in drilling performance and a new low in maintenance.

Here are outstanding features of the Gardner-Denver CF79 Continuous Feed Drifter:

1. *Higher drilling efficiency*—assured because "CF" Feed always holds drill in proper relation to the shank.
2. *Less vibration assures low maintenance*—weight of feed motor, built into drill proper, aids in absorbing recoil—dampens vibration.
3. *Convenient controls*—located in drill backhead—do not invite destructive backing out on full head of air.
4. *Slow motion means less wear*—piston feed motor makes only 2½ strokes per inch drilled, or 60 strokes in drilling a 24-inch change.

For complete facts, write Gardner-Denver Co., Quincy, Ill.

GARDNER-DENVER *Since 1859*

GARDNER-DENVER PRODUCTS KEEP SPEED VICTORY

Tennessee Coal, Iron and Railroad Co., Expands Capacity

A far-reaching program of expansion of steel making and finishing facilities of the Tennessee Coal, Iron and Railroad Company, a steel-producing subsidiary of the United States Steel Corporation has reached virtual completion with the blowing in of a new blast furnace, which will increase the pig iron capacity of T.C.I. by 17 percent.

The program, touching many important phases of company activities, was announced November 13, 1940. Wholly financed by U. S. Steel, the enlargement was occasioned by the then rising demand for steel products. Work was hastened by international developments, and as the program progressed it was directed, wherever possible, toward fulfillment of requirements arising from the government's war needs.

Already completed, according to Robert Gregg, president of the Tennessee Company, are enlargements of production capacities at ore mines, coal mines and quarries, including installation of a considerable amount of new mechanical equipment, and construction of a battery of 73 by-product coke ovens.

Actual construction of the new blast furnace was started April 18, 1941. It features the most modern developments of blast furnace construction and is the first blast furnace in the territory with an all-welded outer shell.

Mr. Gregg called attention to the fact that work has started on another program announced earlier this year which embraces construction of still another battery of 73 by-product coke ovens, opening of another coal mine and installation of electrolytic tinning facilities.

Larger Mill Being Planned For Idaho Scheelite Property

Discovery of a large body of scheelite has resulted in plans for increasing production from 125 tons to 400 tons daily, according to Lawrence L. McLane, manager of Gold Producers, Inc., owner and operator of the property known as the Old Grunter Mine near Shoup, Idaho.

Tennessee-Schuylkill Will Increase Plant Capacity

The Tennessee - Schuylkill Mining Company of Chloride, Ariz., plans to increase the capacity of its lead-zinc flotation plant to around 300 tons per day. Realization of this plan will entitle the company to receive premium prices for zinc produced in excess of its 1941 output. Frank Wimer is president of the company.

Mining Branch of WPB Establishes Field Offices

Field representatives have been appointed by the Mining Branch of the War Production Board to facilitate the handling of the problems encountered by mineral producers in securing necessary machinery, replacement parts and supplies. To date the following offices and representatives have been announced:

Raleigh, N. C. (North Carolina, Florida, South Carolina, Georgia), Samuel A. Silver, Box 2719, 232 New State Office Building.

Charleston, W. Va. (West Virginia, Virginia), Fred Stevenson & Richard Lloyd, State Department of Mines, State Capitol.

Nashville, Tenn. (Tennessee, Kentucky, Alabama), Dr. Charles W. Wilson, Jr., 1014 Stahlman Building.

Little Rock, Ark. (Arkansas, Louisiana, Mississippi, Oklahoma), Howard A. Millar, 432 State Capitol.

Harrisburg, Pa. (Delaware, Pennsylvania, Maryland, New Jersey), Richard M. McQuail, and James F. Organ, 510 Blackstone Bldg., 112 Market St.

Columbus, Ohio (Ohio), John E. Organ, 513 East Town St.

Indianapolis, Ind. (Indiana, Illinois), Carl A. Kelley, 1424 Circle Tower.

Madison, Wis. (Wisconsin, Michigan, Minnesota), Thomas E. Gillingham, Jr., 407 Washington Bldg.

Jefferson City, Mo. (Missouri), E. L. Clark, P. O. Box 395.

Des Moines, Iowa (Iowa, North Dakota, South Dakota, Nebraska, Kansas), Frank West.

Denver, Colo. (Colorado, Wyoming, Utah), Leland H. Hinkley, Regional Supervisor, and Howard A. Storm, Kitteridge Bldg.

Helena, Mont. (Montana, Idaho, Washington, Oregon), W. M. Manning, 222 Power Block.

San Francisco, Calif. (California, Nevada), T. L. Goudvis, Room 569, 1355 Market St.

Ruling on Wire Rope for Mines Revised

The Mining Branch of the WPB has revised the ruling on wire rope for hoisting cables and other mine use, which now becomes eligible for the A-1-c rating provided in paragraph (c) (l) (ii) of Order P-56.

This ruling permits all mines operating under P-56 to endorse the A-1-c rating on any orders for wire rope which is to be used as repairs or replacements for equipment on Schedule A, and deliveries thereunder will be applied against the mines' quarterly quota. This includes hoisting rope, which is considered a part of the hoist. If the mines quota is thereby exceeded, the operator may apply to the Mining Branch for relief, explaining the circumstances and the Branch can review and revise his current quarterly quota if the circumstances justify such action.

Court Rules Gold Mining Exempt From Wage-Hour Law

A case involving the Wage-Hour Division vs. Haile Gold Mines, Inc., was tried recently in the U. S. District Court for the western district of South Carolina. It ruled that gold mining is exempt from regulation under the Fair Labor Standards Act. The court pointed out that gold must be sold to the United States Government under the provisions of the Gold Reserve Act of 1934, and that the sale of gold does not affect interstate commerce, therefore, prohibiting the government's use of the interstate commerce regulation hours as a handle by which to regulate wages in gold mining. The court emphasized that gold mining is not a competitive industry—that the price was set by the government and that the industry was intrastate in character and not interstate. In handing down his decision, Judge C. C. Wyche stated, "gold is unique in that it is one commodity as to which there is an unlimited, and indeed mandatory, market for every producer, and for which there is only one price, fixed by government order. Producers do not vie with one another for market or for price. Since low wages by one producer are not respected in the price at which he sells, they cannot have any effect upon interstate commerce and the price, and as a consequence, the wage, of any other producer. The absence of competition, through the fixity of price and through the unlimited character of the market, insulate each producer and his wages from every other producer and his wages." He further pointed out that in the absence of any relation between the wages paid by the company and interstate commerce, the wages paid by the company are not within the scope of federal regulation. For this reason, he added, the Fair Labor Standards Act cannot apply to an intrastate wage in non-competitive production. The court's decision ruled that the only commerce involved in the sale of gold was the acquisition of gold by the government in which the seller has no choice. Transfers of the gold to the government, even though the gold physically passes over State lines to reach the Mint are pursuant to government order and as such fall under an administrative act of the government, rather than being a shipment in commerce by the company, the court ruled.

Mining Branch of WPB Has New Address

The entire personnel of the Mining Branch under Dr. Wilbur A. Nelson recently moved to its new air-conditioned offices in the Social Security Building at Third and C Sts., Washington, D. C. Previously Dr. Nelson and members of the staff dealing with metal mining, non-metallic minerals, smelting and manufacturing of mining equipment have been in temporary building "E" and Dean McElroy and the coal mining staff have been in temporary "R." Communications to the Mining Branch should now be addressed to Social Security Building, Room 2334, Washington, D. C.

Action on Scrap from Mines

Both coal and metal mines, mills and smelters are participating in the important work of returning scrap material for the furtherance of the war effort and all are again urged to continue their efforts to the utmost. Totals collected to date show iron and steel around 90,000,000 lbs.; copper, 700,000 lbs.; and other metals, 600,000 lbs.

WANTED—*Mine Foreman or Mechanical Production Foreman*

Large Eastern coal company wishes contact capable and energetic man for this position—write full details experience and qualifications to Employment Service, Mining Congress Journal, 309 Munsey Bldg., Washington, D. C.

L. E. YOUNG
Consulting Engineer
Mine Mechanization
Mine Management
Oliver Building Pittsburgh, Pa.

PETER F. LOFTUS
Consulting Engineers
ENGINEERING AND ECONOMIC SURVEYS, ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MINING INDUSTRY
Oliver Building Pittsburgh, Pa.

Two Shafts in Waco Zinc District Being Opened

Mining properties at the St. Louis Smelting & Refining Co. in the Waco, Kansas district, are being prepared for zinc production. Surface work at the No. 4 shaft of the High Five Lease, formerly operated by the Ritter Mining Company has consisted in the erection of a headframe and a 150-ton ore bin. As soon as this property is unwatered, operations are expected to start on the 250 ft. level. The company is also opening the Bennett Mine in the Waco district, following unwatering of that property. Howard H. Utley, Baxter Springs, Kans., is district agent for the company.

Fuel Burning Efficiency of Coal Increases

While coal is one of the lowest priced essential commodities which it is possible to buy, averaging say, roughly, ten pounds for a cent, still, increases in burning efficiency are a large factor to consumers because of the quantity of coal used. A recent report by the Federal Power Commission is therefore interesting in showing that the consumption of coal by utility plants in the United States averaged only 1.35 pounds of coal per kwh. produced during 1940. This is the lowest rate ever recorded and compares with 1.39 pounds per kwh. in 1939. The lowered consumption rate has been due in part to the higher efficiency of new plants, and in part to better plant factors resulting from increased demand for electric power.

It is also interesting to note that during 1940 electric generating plants consumed over 53,000,000 tons of coal, 16¾ million barrels of oil and 183,000,000 m.c.f. of gas. Compared with 1939, the consumption of coal increased 15.5 percent, while oil and gas consumption fell off 3.7 and 4.2 percent, respectively.

Record Fluorspar Output in 1941

Great demand for steel, aluminum, glass, enamel and hydrofluoric acid, brought a heavy call for fluorspar in 1941 from domestic deposits. Shipments from mines last year, according to the Bureau of Mines, totaled 320,669 short tons, a 37 percent increase over the previous year, and 22 percent ahead of the previous record made in 1918. Shipments from Kentucky, Nevada, New Mexico, and Utah established all-time highs and the movement from Illinois (133,333 tons) was the second largest on record.

Peruvian Trade Agreement Reduces Tariff on Bismuth

Under the Tariff Act of 1930 bismuth was dutiable at 7½ percent ad valorem. In the agreement with Peru this duty was reduced to 3¾ percent ad valorem. Peru is one of the world's largest producers of bismuth and is almost the sole supply of imports entered into the United States under this tariff. Bismuth is produced in the United States as a by-product of the lead refining industry. Beginning in 1930 there have been large imports of bismuth contained in lead bullion. The United States production, therefore, comes from the processing of both domestic and imported lead ore and bullion. Total United States import of bismuth in 1940 amounted to 124,000 lb., valued at $118,000. All imports for that year came from Peru.

Road Building Program Under Way To Idaho Mining Districts

An appropriation from the Public Roads Administration in Washington, D. C., for $68,000 has been made, for locating and surveying a new highway from McCall to the Yellow Pine Mine at Stibnite. The proposed road will pass through the important Yellow Pine mining district and will, therefore, facilitate transportation of concentrates from many of the smaller operations. The State of Idaho has also appropriated $10,000 for repairing the road currently used to haul concentrates from the Yellow Pine property to Cascade. It is also reported that a new road will be built in Owyhee County. Appropriations totaling $68,800 for improvement of a twenty-one mile stretch of road over which the South Mountain Mining Company is hauling a large tonnage of zinc, lead and silver ore to the Idaho-Oregon cut-off railhead center at Jordan Valley, Oregon.

Another highway in Idaho scheduled to have improvements very soon is the 64 mile stretch from Arrow Rock dam to Atlanta.

All Engineers Meeting Held In Washington

Some idea on how many engineers are in Washington helping to direct the war program may be obtained from the All Engineers Dinner held on May 18, at the Mayflower Hotel. A local committee ventured the estimate that if 500 engineers from the various 16 engineering societies in Washington attended it would be an outstanding success. Instead of 500 turning out, more than 1300 came, and around 200 were turned away.

James W. Parker, president of the American Society of Mechanical Engineers was toastmaster. Although his comments dwelt on the engineers' job in war production, the substance of his talk as well as those of William L. Batt and Lieutenant-General Brehon Somervell is interesting to the non-technical man as well. Mr. Parker described the present war industrial activity as one which has the switch thrown in and is in to stay until the

No Tools Required!

UNION-CLIPPED Tuffy Mining Machine Ropes

Tuffy Rope ends are protected by a special metal sheath which allows easy installation without injury to the rope. Tuffies are made of Union-Formed (pre-formed) Wire Rope for safety in mining operations and longer service.

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war is over. He urged engineers to preach the doctrine of conservation of materials and man power. William L. Batt, chairman of the Requirements Committee, War Production Board, commented briefly on the factors that tend to create war. He said that the average American overlooks the fact that this nation is the largest consumer of nickel, tungsten and vanadium and other products. "In the country's desire to lead a peaceful life," he said, "we have neglected to build up stockpiles of these important materials in case of war. Therefore, we must take the lessons of this war and carefully apply them to any future emergency." In spite of the hope for future peace, he said, we must prepare ourselves and accumulate all types of materials, put them in a storehouse and lock the door and forget them until the next emergency. He inferred that this would be the plan of the government for the future.

Mr. Batt pointed out three important things that engineers and executives should carefully observe: (1) conservation of materials and supplies; (2) specifications of all machines and parts should be carefully studied in order to save consumption of strategic materials for only the most important uses; and (3) management should be directed more along the lines of sound engineering policies. He is convinced that there is enough material in this country to win the war, but it must be husbanded carefully under the direction of responsible people so that not a pound is wasted. Mr. Batt said it was his hope that labor and management could carry on in the same cooperative spirit in peace time as they are now in war time.

Lieutenant-General Somervell made a very impressive talk, pointing out that "when Hitler put this war on wheels he ran it straight down our alley, when he hitched his chariot to an internal combustion engine he opened up a new battlefront, a front that we all know well. It's called Detroit." He said one of the biggest mistakes Hitler ever made was his misjudgment of the ability of this nation to harness its unity of purpose and create a speed in industrial production never before witnessed in our history.

MacArthur Mining Company Plans Zinc Production

According to J. W. Hoffman of Kansas City, manager of the MacArthur Mining Company, preparations are virtually completed for the sinking of two new shafts for the exploitation of zinc deposits near Baxter Springs, Kansas. The shafts will be sunk to about 400 ft. and be about 450 ft. apart. Two 200 h.p. Fairbanks-Morse diesel engines will be installed to provide power for generating electricity and also driving a 1,200 cu. ft. compressor. Two large electric driven turbine pumps will also be installed. A. E. Campbell of Commerce is in charge of operations. A. G. Johnson of Rosiclare, Ill., is consulting mining engineer for the company.

A.I.M.E. Anthracite Section Holds Spring Meeting

The Spring Meeting of the Pennsylvania Anthracite Section of the A. I. M. E. was held at the Scranton Club, Scranton, Pa., April 11. Mr. Cadwallader Evans, Jr., Vice President of the Hudson Coal Company, introduced the principal speaker, Mr. D. Harrington, Chief, Health and Safety Branch, U. S. Bureau of Mines, Washington, D. C., who explained the operation of the new Federal Mine Inspection law. Mr. S. A. Ash, Supervising Engineer, Eastern District, U. S. Bureau of Mines, presented an illustrated paper on "The Successful Extinguishment of Mine Fire in a Steeply Pitching Vein by Means of Sealing and Slushing." Others speakers were Mr. Richard Maize, Secretary of Mines, State of Pennsylvania; C. A. Garner, Vice President of Jeddo-Highland Coal Company; J. J. Forbes, Chief of Inspection Division, U. S. Bureau of Mines; and A. B. Parsons, Secretary of A. I. M. E. More than 150 were in attendance. Mr. Wilmot C. Jones, Chairman, presided, and Mr. Harry Otto, Mining Engineer, Hudson Coal Company, was in charge of arrangements.

Screening Facts

Not Just Claims

PREPARATION and concentration plants throughout the Mining Industry all agree that their screening equipment is the heart of their plant and to produce profits, must function efficiently. Simplicity Gyrating Screens do fulfill this requirement. The best proof of this fact is that over 1300 operating plants, each having from one to forty-six Simplicity machines, are on our list of known users.

In one coal screening operation, a 6′ x 16′ shaker screen was replaced by a 5′ x 12′ Simplicity Gyrating Screen. With the shaker screen, 85 minutes were required to load one carload of egg coal. With the Simplicity Screen, only 20 minutes were required and in addition 15% more coal was recovered.

The Simplicity Gyrating Screens are outstanding in their freedom from external vibration, so they can be placed in tipples and bridges without concern over possible damage to the supporting structure. This feature, combined with their large capacity and freedom from the usual maintenance costs, has established them as favorites with all their users.

For screening facts, ask your Simplicity Representative or write for descriptive bulletin

Simplicity Engineering Company

DURAND, MICHIGAN

Clause Restricting Gold-Silver Mines Deleted From P-56

The 30 percent clause applying to gold and silver mines was deleted from Preference Rating Order P-56 by Donald Nelson, head of the WPB. Under the March 2 amendment a "mining enterprise" was defined as "any plant actually engaged in the extraction by surface, open pit, or underground methods, or in the beneficiation, concentration or preparation for shipment of the products of mining activity, but not including any plant more than 30 percent of the production of which in dollar value consists of gold and/or silver." This new amendment became effective May 15. Amendment came following hearings before the Senate Special Silver Committee.

Utah Tungsten Deposits Being Developed

A group of four tungsten claims in the Granite mining districts, near Beaver City, Utah, are being developed by the U. S. Vanadium Corporation. The company recently took a 10-year lease on the property from A. E. McGarry of Los Angeles, and Hartley G. Dewey of Yosemite, Calif. Clarence H. Hall, field engineer for the U. S. Vanadium Corporation, is in charge of operations. Alex Danson is foreman.

Full Production at Morenci Expected Soon

The mine, concentrator and smelter of the new Morenci Unit of the Phelps Dodge Corporation in Arizona is expected to be operating at capacity in the very near future. The copper content of the ore treated in the 25,000 ton concentrator averages about a little more than 1 percent copper. Total outlay for this new and important copper producing unit of the nation has been over $34,000,000. Before this new program was completed the Defense Plant Corporation allotted Phelps Dodge $28,000,000 for an 80 percent expansion, which already is under way.

Several Gold Mines in Alaska Suspend Operations

It is reported that the Polaris Taku Mine, one of the largest gold producers in Alaska will cease operations early in May. The short season in which to bring in supplies and transport concentrates with resultant high costs, plus an increasing shortage of labor due to the war are given as the reasons for the shutdown, which may be for the duration. Inability to obtain equipment due to priorities is another important factor influencing the suspension of operations. The mine is on the Tulsequah River, in the Atlas district, about 50 miles from Juneau. From the start of production in November, 1937, to the end of the last fiscal year, April 30, 1941, the estimated value of output was around $2,500,000. The ore had been treated in a 300-ton flotation plant.

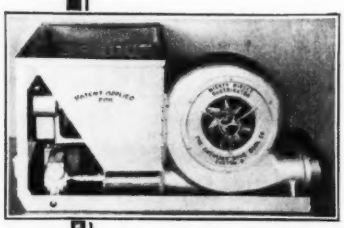
B. D. Stewart, Commissioner of the Department of Mines, Juneau, Alaska, has received word that the Hi Yu Mining Company is closing down operations of their property by that name and also will suspend work at the Mastodon mine in the Circle districts. Labor shortage is given as the reason for the suspension. The company will, however, continue to operate the Red Top mine near McKinley Park as long as it has manpower available.

Eagle-Picher is Reopening Property In Picher Field

A headframe and an electric hoist have been installed at the Lucky Jew "50" shaft in the northwest section of the Picher zinc field, Oklahoma. The shaft is almost dewatered to the level where a drift will be run to connect with an ore body previously prospected by churn drilling on the Parmenter land which adjoins the Lucky Jew on the West. A standard gauged railroad spur will be made to the property very soon and ore will be hauled to the company's Central mill.

The company has also started shaft sinking on the Beck-Robinson Lease not far from Cardin, Okla.

ROCK DUSTING IS GOOD INSURANCE



MIGHTY MIDGET

distributes MORE THAN A TON OF DUST AN HOUR

It does a WHALE of a job. 34 pounds per minute for an entire shift. Hopper has capacity for 2 sacks of dust. Light weight and portable. Compact and durable. Carried by two persons; on shuttle car; coal car or conveyor. Price has not been boosted.

Larger machines, using up to 500 ft. of hose, can be supplied for dusting air courses and back areas. AMERICAN MINE DOOR CO. build ROCK DUSTERS for every requirement—the Fan Nozzle type applies the dust uniformly on roof and ribs of entries—30 models to choose from—send for bulletin today.

LABOR AND TIME SAVING DEVICES

Automatic Mine Doors — Automatic Switch Throwers — Automatic Signal Systems — Car Transfers — Cable Splicers — Bond Terminals.

THE AMERICAN MINE DOOR COMPANY

2063 DEUBER AVE. CANTON, OHIO

Trade Agreements

(*Continued from page* 33)

are generally far lower than in this country, and depreciated currencies afford a further important competitive advantage.

May we refer briefly also to the fact that many of our mining operations are carried on in remote locations. Whole communities and large sections of our population are completely dependent upon continued operation of the mines. Not only the mine workers and their families, but tradesmen; farmers; railroads; local, county and state governments, and school systems are supported wholly or in part from the proceeds of mining. We urge that you do not add to the difficulties of these many thousands of persons and hundreds of communities in the inevitable period of readjustment which will follow the war.

It might be said that the so-called "escape clauses" in our foreign trade agreements could be invoked to avert hardship after the war. To the mining man this argument, unfortunately, carries no weight. Experience under previous trade agreements, notably that of the zinc industry under the Canadian agreement, has convinced him that no relief may be anticipated under these provisions, even though a conclusive showing of injury to the domestic industry is presented. The "escape clauses," we regret to say, are totally inadequate to give mineral producers any confidence in the future. Any reduction of tariff protection which appears to them to be of a permanent nature will discourage exploration and development, and to that extent will counteract the strenuous efforts now being made to secure increased production.

We ask that you take no action at this time which would hamper or impede the fullest possible production within this country of the metals and minerals so critically needed in the war program. We wish soberly to warn those charged with the negotiation of these treaties that reductions in the present duties on our mineral products which are not safeguarded by positive and automatic provision for their termination at the close of the war, are contrary to the national interest in the present crisis.

TIMES-HERALD

"I'm ready sir. Now what kind of mines do you want me to locate?"

MANAGER—Independent Pennsylvania anthracite producing company seeks services of individual possessing following qualifications to manage its affairs: Executive ability, mining engineering qualifications, understanding of shipping operations, general operating experience. Liberal remuneration. State age, experience and full particulars. All replies strictly confidential. Box MCJ, 309 Munsey Building, Washington, D. C.

CONCEALED ASSETS

By ROBERT R. LUCEY*

Carbide lamps a-swinging
Steel, on hard rock ringing,
Another shift beginning
Under ground.

Din, from ore trains running,
Shots, like armies gunning,
Ears and brain benumbing
Under ground.

Sulphide crystals gleaming,
Dull gray rock redeeming
Fairy painting seeming
Under ground.

Framing saws a-screeching,
Metal fingers reaching,
Wordless sermons preaching
Under ground.

Surface—drab and dreary—
Seems like God grew weary—
Camouflage, you hear me?
That's where wealth is born.

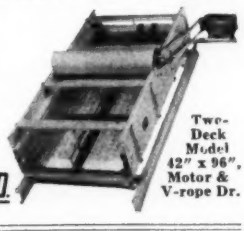
* Secretary, Florence Council, Arizona Small Mine Operators Association, Florence, Ariz; and an accomplished lyricist, as this poem attests.

UNIVERSAL SCREENS and UNIVIBE RIDDLES

Vibrating Screens and Vibratory Riddles, in many sizes and types, all priced most reasonably. . . . Tried, Proved and Guaranteed Products. Leaders in Screening Field Since 1919.

Write for Catalog on Screens and Screening.

UNIVERSAL VIBRATING SCREEN CO.
RACINE — WISCONSIN



Two-Deck Model 42" x 96", Motor & V-rope Dr.

Mineral Matter in Coal

(*Continued from page* 23)

of this sort are difficult to improve by selective mining or any method of cleaning. In the majority of coals, the ash is highly concentrated in certain parts of the bed. For example, a few inches of coal at the top or the bottom of the bed may be high in ash; again, the coal may contain several thin bands of high-ash coal. Thus, one can imagine many combinations not only of the kinds of minerals but also the concentrations of minerals with the coal material. The mineral content of each coal is a specific problem and one can make few generalizations that will apply to all the coals in a particular area.

Coals with less than 2 percent ash will show practically no mineral grains in the thin sections. The ash from such coals is derived largely from inherent mineral matter, that is, the mineral matter originally contained in the living plants that formed the coal. Figure 7 is from a layer of coal that contained only 1 percent ash and from that part that contained a moderate amount of spores. No particles of mineral matter are visible.

Microscope Aids in Selecting "Pure Coal"

"Pure coal"—that is, coal with 1 percent or less ash—may find certain uses, such as for internal-combustion engines, colloidal fuel for ships, and electrodes for electrometallurgical work. In anticipation of such possible uses, Bertrand[7] developed a float-and-sink method for a more or less complete separation of anthraxylon from the other coal constituents whereby a coal of very low ash content is produced.

If a demand for "pure coal" ever arises, the authors point out that the microscope is sure to play an important role in selecting the purest coal. The microscopic examination of mineral matter in coal has already disclosed layers of coal of surprising purity in certain beds. Layers of coal with an ash content of 1 to 1.5 percent sometimes occur even in coals of medium ash content.

[7] Bertrand, F. M., Pure Coal and Its Application: Colliery Guardian, Vol. 150, 1935, pp. 803-805, 845-848.

Belt Conveyors

(*Continued from page* 25)

of three sections each 340-ft. centers, using 36-inch wide belt at 500 feet per minute for a capacity of 750 tons per hour of minus 4-inch ore. Each section is driven by a 100 h.p. motor through a double reduction herringbone gear speed reducer. Troughing and return belt idlers are all antifriction bearing equipped, as are the reducer and all shaft bearings, with the idlers rubber cushioned at receiving points and with self-aligning idlers at intervals. Gravity weighted take-ups keep slack out of the conveyor line.

Euclid 15-ton trucks average a half-mile haul between shovels and dump hopper over roads in the pit maintained by two D-8 Caterpillar tractors and an Austin-Western "99" power patrol grader.

Trucks end-dump into the hopper from which an apron conveyor feeds the ore to a bar screen that allows all material smaller than 4-inch to pass through to the foot end of the first conveyor section. Over 4-inch material passes to another apron where it is handpicked and discharged to the primary crusher and then deposited upon the protective layer of finer ore already on the belt, where it travels upward over the three conveyor sections to the concentrator, one of the largest on the Mesabi range with a rated capacity of about 700,000 tons of iron ore concentrates per season.

Belt conveyor transportation in the metal mining industry is not limited to handling ore from open pit mines. Another common use is that of stackers, with or without radial booms, for placing concentrates in storage whenever railroad cars are not available, and thus permit continuous operation of the plant.

Wheels

(*Continued from page* 55)

Meanwhile the Committee for Reciprocity Information carried on with the negotiation of further trade agreements with the Republics of Bolivia and Mexico; listed among the commodities subject to duty reduction were antimony, lead ore, metal and related products, molybdenum ore or concentrates, quicksilver, tungsten ore or concentrates, zinc ore, metals and related products, including zinc oxide and zinc sulphate, fluorspar, and graphite.

United in expressing their opposition before the committee to any duty reduction beyond the duration of the war were Senators Abe Murdock of Utah, Berkeley L. Bunker of Nevada, E. D. Millikin of Colorado, Pat McCarran of Nevada, Burton K. Wheeler of Montana, and E. W. McFarland and Carl Hayden of Arizona. Representatives Compton I. White of Idaho, John R. Murdock of Arizona, Henry C. Dworshak of Idaho, J. Will Robinson of Utah, J. G. Scrugham of Nevada, and Jeannette Rankin of Montana, took the same position and Representative Robinson, who is chairman of the informal group of Rocky Mountain Congressmen in the House, placed in the record a resolution stating the position of the members in united opposition to duty reductions extending to the post war period.

Appearing for the mining industry Julian D. Conover, Secretary of the American Mining Congress, made an extensive statement in confirmation of the brief filed by the AMC. (See page 17.) He expressed serious doubt that any reduction in duty is needed, for the reason that large quantities of the materials listed are now being imported free of duty under a Navy statute enacted in 1914 and that furthermore Government agencies are now authorized to purchase minerals from foreign countries at whatever prices and in whatever quantities are deemed advisable.

Quicksilver producers were represented by H. W. Gould, of San Francisco; antimony by Knott B. King, Texas Mining and Smelting Company, Laredo, Tex.; tungsten by J. C. Trimble, American Tungsten Association; fluorspar by J. M. Blayney and Francis G. Fabian.

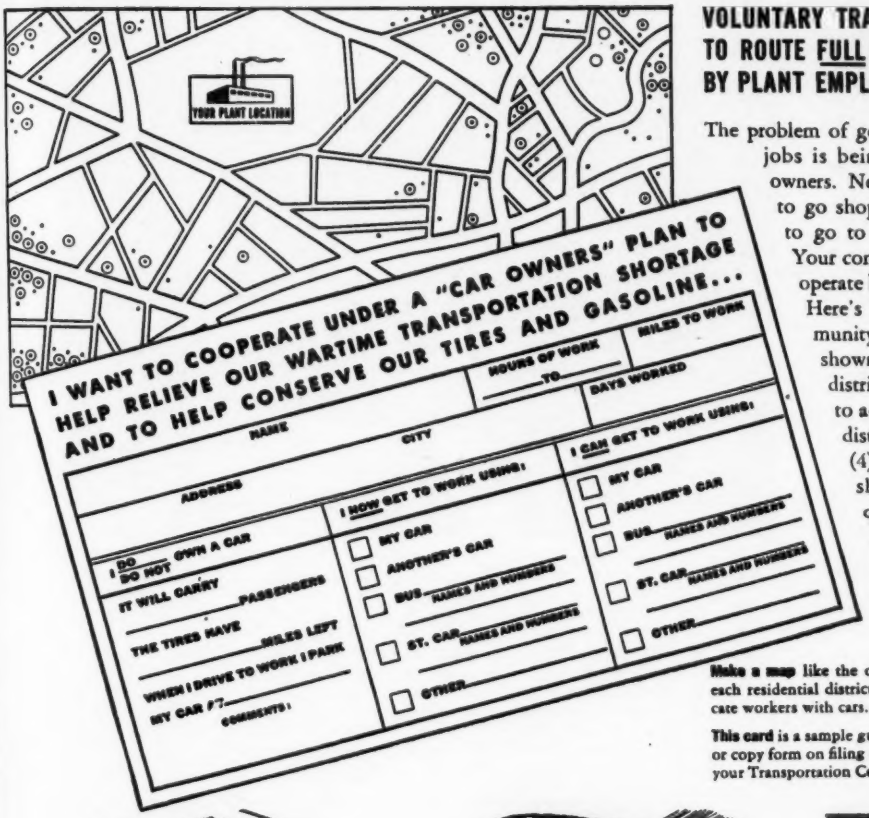
Republic Steel Contracts for Coal Preparation Plant

The Republic Steel Corporation, recently awarded Roberts and Schaefer Co. of Chicago a contract for the erection of a plant for one of the Republic Steel mines in Pennsylvania.

The plant is to consist of tipple dumping facilities (revolving dump, car feeder, etc.) having a capacity of 700 tons of run-of-mine coal per hour; belt conveyer to picking and crushing facilities located over a 2,000-ton reinforced concrete storage bin for blending coals from mine; belt conveyor to cleaning plant of concrete and steel construction utilizing Jeffrey Baum type jigs, and Hydrotators for washing 4 x 0 coal at the rate of 700 tons per hour; and with complete dewatering and water settling facilities and centrifugal dryers.

Also included are river loading facilities of all cleaned coal at the rate of 700 tons per hour. Plant is to be completed during the last quarter of the year.

MANY LARGE COMPANIES ARE NOW TAKING A CENSUS OF EMPLOYEES' CARS AS PART OF NATION'S PROGRAM TO GET 40,000,000 WORKERS TO THEIR JOBS ON TIME


YOUR PLANT LOCATION
I WANT TO COOPERATE UNDER A "CAR OWNERS" PLAN TO HELP RELIEVE OUR WARTIME TRANSPORTATION SHORTAGE AND TO HELP CONSERVE OUR TIRES AND GASOLINE...
NAME
CITY
ADDRESS
HOURS OF WORK
TO
MILES TO WORK
DAYS WORKED
I DO / DO NOT OWN A CAR
IT WILL CARRY PASSENGERS
THE TIRES HAVE MILES LEFT
WHEN I DRIVE TO WORK I PARK
MY CAR #?
COMMENTS:
I NOW GET TO WORK USING:
MY CAR
ANOTHER'S CAR
BUS NAMES AND NUMBERS
ST. CAR NAMES AND NUMBERS
OTHER
I CAN GET TO WORK USING:
MY CAR
ANOTHER'S CAR
BUS NAMES AND NUMBERS
ST. CAR NAMES AND NUMBERS
OTHER

VOLUNTARY TRANSPORTATION COMMITTEES TO ROUTE FULL CARS TO WORK ARE SET UP BY PLANT EMPLOYEES IN EACH COMMUNITY

The problem of getting 40,000,000 workers to their jobs is being taken over by America's car owners. Neighbors are already doubling up to go shopping, to take children to school, to go to work . . . *but not enough of them!* Your company and your employees can co-operate by taking a census of workers' cars. Here's how you can do it in your community: (1) Fill out cards, like the one shown here, (2) Sort cards by residential districts, (3) Select sectional committees to act as traffic control groups for each district to assure equitable use of cars, (4) Route *full* cars to work on every shift. Details can be worked out quickly by you . . . your workers . . . your community. The important thing is to start today to get every last mile of use from our cars, our gas, our tires!

Make a map like the one above, on which to chart the routes for each residential district. Dots indicate workers' homes; circles indicate workers with cars.

This card is a sample guide. Make changes to suit your needs. Reprint or copy form on filing cards for each worker to fill out and turn in to your Transportation Committee.

Trolleys can't do it ALONE. Even with staggered work hours to level off transportation peaks there aren't enough trolleys to take America's millions to work.

Buses can't do it ALONE. They're already taxed to their full seating capacity. And enough vital steel and rubber can't be spared to build enough new buses.

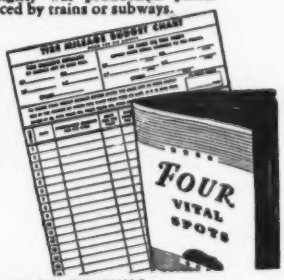
Trains can't do it ALONE. Although every railroad is cooperating 100%, many of America's mighty war production plants can't be serviced by trains or subways.

HOW TO CONSERVE MECHANICAL RUBBER GOODS

This 48-page book is for managers, engineers and plant operating men. It shows how you can conserve rubber through proper handling, installation and care of rubber conveyor, elevator and transmission belts; all types of industrial hose; packings; linings; rolls; mountings; and other mechanical rubber goods; and electrical wires, cables, and tapes. For free copies, write directly to Mechanical Goods Division, United States Rubber Company.

GET FREE MILEAGE BUDGET CHARTS

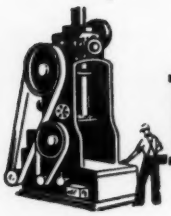
and copies of this free 32-page book on tire care from your local U. S. Tire Dealer or write direct to the United States Rubber Company. Hundreds of thousands of these charts and books are already in the hands of American car owners — helping to save tires, gas and oil.



IN AMERICA'S FIGHT FOR LIFE, EVERY TIRE-MILE MUST BE SAVED FOR ESSENTIAL DRIVING

UNITED STATES RUBBER COMPANY

1230 Sixth Avenue • Rockefeller Center • New York



MANUFACTURERS' Forum

New Load-Center Unit Substation

New standardized load-center unit substations are now available in sizes ranging from 100 to 2,000 k.v.a., according to an announcement by the Allis-Chalmers Mfg. Company, Milwaukee, Wis. These compact, coordinated, factory-built units can be installed anywhere in industrial plants or power distribution centers, saving valuable headroom, floor space and long secondary runs of heavy copper.

Extremely flexible, the standard unit substations offer a wide choice of incoming- and outgoing-line arrangements. The substation consists of a metal-enclosed incoming-line section, a throat-connected transformer and a low-voltage feeder section.

On the high-voltage side potheads, disconnect switches, oil fuse cutouts, metal-clad switchgear or direct connection through terminal box can be supplied. On the low-voltage side, stationary or drawout air breakers, electrically or manually operated, are furnished. Transformers can be oil immersed, dry type, or non-inflammable chlorextol liquid-filled.

Complete enclosure, uniformity of appearance, absence of exposed leads, buses and splices—all make the load-center unit substation as attractive addition to industrial plant or power distribution center.

Installation of the standard unit substations is quick and easy—the two or three component sections shipped from the factory are simply throat-connected and the power leads attached. Standard load-center unit substations are available for either indoor or outdoor service.

NAVY "E" AWARDED TO JEFFREY MANUFACTURING CO.

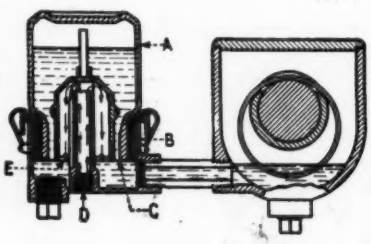
The Jeffrey Manufacturing Company of Columbus, Ohio, was the recipient of the Navy "E" award for production achievement on May 12. This traditional Navy symbol is for excellence—for a job "well done." The company is the first in Columbus to attain this honor and employees are permitted to wear the Navy "E" button. Captain Robert Henderson, U. S. Navy retired, presented the award and the acceptance address was made by Robert W. Gillispie, President of The Jeffrey Manufacturing Company. Acceptance of the Navy "E" insignia was made by H. W. DeBruin, Vice President in Charge of Manufacture. Standing from left to right (front row) in the above photograph are: Dr. Harold Lancaster, H. W. DeBruin, Lt. Gov. Paul M. Herbert, Captain Henderson, R. W. Gillispie, Governor Bricker, Commander Bowman, O. R. Ehret, and Major General Daniel Van Voorhies.

Constant Level Lubricator

A new constant level lubricator for the protection of today's vital machinery is offered by the Oil Rite Corp., 3466 S. 13th St., Milwaukee, Wis. It holds a visible reserve supply of oil, and releases automatically just as much as is needed to maintain a constant predetermined level of lubricant. Its use is said to (1) insure adequate lubrication at all times and (2) prevent oil waste, and the deterioration or spoilage of material caused by oil throw.

This new lubricator is used on electric motors, pillow blocks, pumps, ventilating fans, gear boxes—wherever bearings and other machinery parts must be provided with an ample supply of lubrication.

When the reservoir—(A) in the accompanying diagram—is filled and inverted into position on the base (B), the lower edge (E) of the inverted bucket or bell determines the oil level which the lubricator will maintain. When the level falls below this point, air from the vent (D) escapes under the side of the



bell—as at (C)—up to the top of the lubricator, permitting oil to flow down until the level to be maintained again seals across the base of the bell. Operation is entirely automatic.

Because this operating principle provides large size, separate passages for air and oil, the manufacturer emphasizes that the flow of lubricant is not restricted in any way.

Four standard sizes, with capacities of 2, 4, 8, and 16 ozs., are available.

For Testing pH.

R. P. Cargille, 118 Liberty Street, New York, N. Y., announces a new Cargille Buffer Set No. 1 with Hydrion Wide-Range pH test paper for pH tests (for degree of acidity or alkalinity of solutions).

Solutions of known pH, made by dissolving the tablets in this set, are applied to the test paper to bring out on the paper the color for any half unit from pH 3 to pH 11. The colors are used for reference to judge the pH of the sample being tested; comparisons made with these reference colors are more accurate than those made with color charts. Readings can be made to one-half pH unit.

Designed for control tests in the plant by unskilled workmen; also for quick, preliminary tests in laboratories where more elaborate pH apparatus is available.

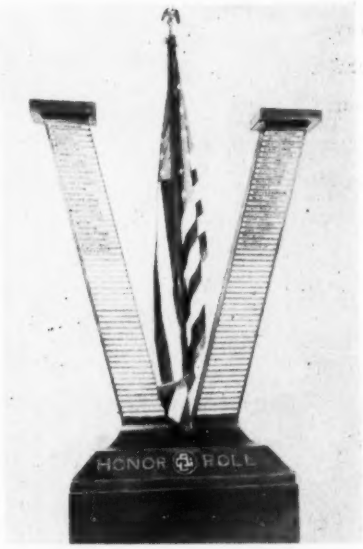
Tools for Heavy Machining

A new standard series of Kennametal tools in large turning and facing styles for heavy machining has been developed by the McKenna Metals Co., Latrobe, Pa. The position of the tip in the shank permits a greater thickness of steel under the cutting point of the tip, permits the top surface or chip breaker to be ground without the necessity of grinding away steel, and during the life of the tool the height of the cutting point is retained rather than being lowered each time the tool is ground.

Quick Hardening Iron Cement for Patching Concrete Floors

A new product has been developed by the Smooth-On Manufacturing Co., 570 Communipaw Avenue, Jersey City, N. J., for quick patching of cracks, ruts, and shallow holes in concrete floors. This product, known as Smooth-On No. 7B Quick Patch Cement, hardens quickly and adheres firmly to the surfaces with which it is in contact. Like other Smooth-On cements, the new composition has an iron base, so that it is extremely wear resistant as well as dustproof, oilproof and waterproof. Patches of Smooth-On No. 7B harden overnight, permitting full traffic the following morning, and becomes stronger with age.

Honoring Employees in U. S. Service



To honor employees who have entered the service of their country, an Honor Roll is posted in a novel and attractive manner on a Victory "V" in the assembly room of the Gardner-Denver rock drill manufacturing plant in Denver, Colorado. As additional employees enter the service, their names are entered on cards that are then slipped into place on the "V." The flag and the "V" are floodlighted.

Preserving The Life of Mine Timbers

Hand brushing the preservative on round or sawed timbers

A wood-preserving treatment said to be quickly and easily applied to all species of green wood is announced by the Osmose Wood Preserving Company of America, Inc., Buffalo, N. Y. The preservative compound, called Osmosalts, is furnished in dry powder form to which is added a prescribed amount of water. This mixture can then be applied by brushing or dipping to the green poles, posts, ties or other timbers, while the timber still contains sap. Green wood has a high moisture content (natural sap of the wood) of very low concentration, while the Osmose suspended mixture has a very high concentration. This difference in low and high concentration sets up Osmotic pressure which forces the preservative salts to the wood thereby forming a deep zone of protection that is said to resist wood decay and prevents rot.

The manufacturer points out that any species of fresh cut native timber locally obtained, can be treated with this preservative at the location where the timbers are to be used or at the source of supply without waiting for the wood to season. The salts are said to be odorless and fire retardent.

Catalogs and Bulletins

EARTH MOVING EQUIPMENT. *La Plant Choate Mfg. Co., Inc.*, Cedar Rapids, Iowa. Form No. A-265-675 describes the earth-moving, land-clearing and snow-removal equipment manufactured by the company. 16 pp.

R. G. LeTourneau, Inc., Peoria, Ill. Bulletin A-278 is a pictorial broadside of the manufacturer's line of bulldozers. Catalog A-276 is the manufacturer's recently released book describing its complete line of earth-moving equipment. 32 pp.

ELECTRIC GAGES. *General Electric Co.*, Schenectady, N. Y. GEA-3673 is a well-illustrated booklet describing the different types of gages available for measuring mechanical strains. Its uses include the determination of stresses on structural parts in the rails of railroad tracks; locomotive running gear; and beams of shovels and cranes. 8 pp.

ELECTRICAL EQUIPMENT. *Duquesne Electric & Mfg. Co.*, Pittsburgh, Pa. The company has recently issued a small booklet listing available rebuilt machinery ready for shipment. 24 pp.

Keystone Carbon Co., St. Marys, Pa. The company recently issued an attractive catalog, K-15, describing and illustrating its complete line of industrial brushes for electrical units. Specifications and price lists are also included. 24 pp.

FLEXIBLE PIPE. *Pennsylvania Flexible Metallic Tubing Co.*, Philadelphia, Pa. Bulletin 71 describes the company's all-metal flexible assemblies commonly used in connection with Diesel engine installations for exhaust pipes, air intakes, and supply lines. 8 pp.

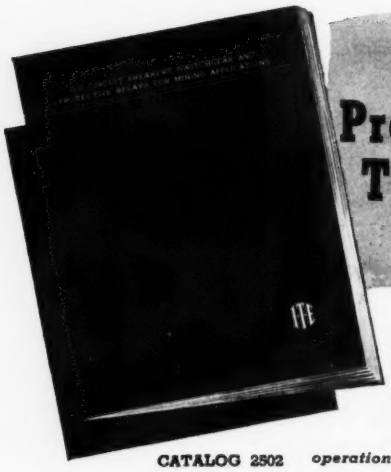
GAS BURNERS. *Peabody Engineering Corp.*, 580 Fifth Avenue, New York City. Bulletin No. 203 describes the company's line of gas and oil burners for use in industry. 4 pp.

JAW CRUSHERS. *Denver Equipment Co.*, Denver, Colo. Bulletin C12-B1 describes and illustrates features of the company's steel frame, anti-friction bearing type jaw crusher. 4 pp.

MINE CAR LOADERS. *Gardner-Denver Co.*, Quincy, Ill. Bulletin GD-9 describes and illustrates the latest features of the manufacturer's line of mine car loaders. 16 pp.

PRESERVING MINE TIMBERS. *Osmose Wood Preserving Co. of America, Inc.*, Buffalo, N. Y. Form 124-5M-342K describes and illustrates methods of applying the company's preservative to green timbers. Pp. 6.

PUMPS. *Allis-Chalmers Mfg. Co.*, Milwaukee, Wis. Bulletin B6018-B describes motor-pump units and base-mounted units built for capacities from 10 to 2,750 g.p.m. and for heads up to 575 ft. The bulletin is well illustrated and head capacity tables are included. 36 pp.



Peak Production Tonnage Aid

It is a handbook of equipmentwhichgives protection from needless outages and slowdowns in electrical operation of mechanized mines.

CATALOG 2502

I-T-E Catalog No. 2502 is a complete description of d-c circuit breakers, switchgear and protective relays for mining applications. Its completeness recommends it particularly to those who are engaged in or contemplating mechanized mining.

Our plant, busy as it is with direct war effort in the building of switchgear, has capacity for prompt action in meeting the demands of the vital mining industry.

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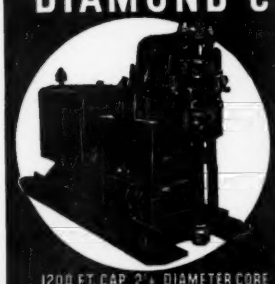

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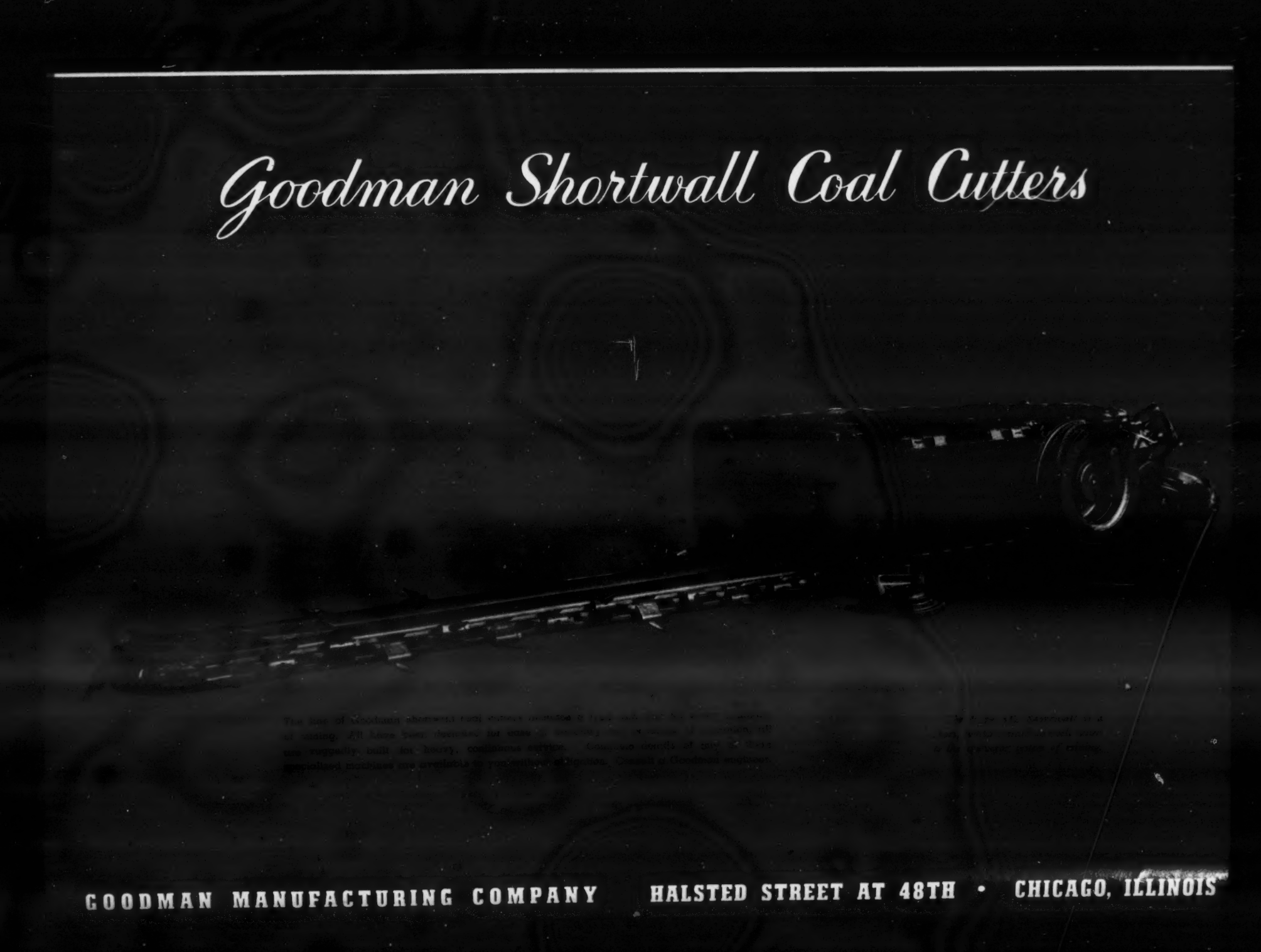

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